

```
In [1]: pip install flask pandas plotly
```

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Defaulting to user installation because normal site-packages is not writeable
Requirement already satisfied: flask in c:\programdata\anaconda3\lib\site-packages
(2.2.2)
Requirement already satisfied: pandas in c:\programdata\anaconda3\lib\site-package
s (2.0.3)
Requirement already satisfied: plotly in c:\programdata\anaconda3\lib\site-package
s (5.9.0)
Requirement already satisfied: Werkzeug>=2.2.2 in c:\programdata\anaconda3\lib\sit
e-packages (from flask) (2.2.3)
Requirement already satisfied: Jinja2>=3.0 in c:\programdata\anaconda3\lib\site-pa
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Requirement already satisfied: itsdangerous>=2.0 in c:\programdata\anaconda3\lib\s
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Requirement already satisfied: click>=8.0 in c:\programdata\anaconda3\lib\site-pac
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Requirement already satisfied: python-dateutil>=2.8.2 in c:\programdata\anaconda3
\lib\site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in c:\programdata\anaconda3\lib\site-p
ackages (from pandas) (2023.3.post1)
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-packages (from pandas) (2023.3)
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e-packages (from Jinja2>=3.0->flask) (2.1.1)
Requirement already satisfied: six>=1.5 in c:\programdata\anaconda3\lib\site-packa
ges (from python-dateutil>=2.8.2->pandas) (1.16.0)
Note: you may need to restart the kernel to use updated packages.
```

```
In [ ]: import pandas as pd
import random
import time
import matplotlib.pyplot as plt

# Initialize an empty DataFrame to store sensor data
data = pd.DataFrame(columns=["timestamp", "temperature", "pressure", "vibration"])

# Function to simulate data
def generate_data():
    from datetime import datetime
    current_time = datetime.now().strftime("%H:%M:%S")
    temperature = random.uniform(50, 100) # Simulated temperature (Celsius)
    pressure = random.uniform(100, 200) # Simulated pressure (kPa)
    vibration = random.uniform(0.5, 2.0) # Simulated vibration (m/s^2)
    return current_time, temperature, pressure, vibration

# Function to detect anomalies
def detect_anomalies(temp, press, vib):
    anomalies = []
    if temp > 80:
        anomalies.append("High Temperature")
    if press > 150:
        anomalies.append("High Pressure")
    if vib > 1.5:
        anomalies.append("High Vibration")
    return anomalies
```

```

# Function to update and plot data
def update_and_plot(data):
    plt.clf() # Clear the previous plot

    # Plot each metric
    plt.plot(data["timestamp"], data["temperature"], label="Temperature (°C)", color="blue")
    plt.plot(data["timestamp"], data["pressure"], label="Pressure (kPa)", color="blue")
    plt.plot(data["timestamp"], data["vibration"], label="Vibration (m/s²)", color="blue")

    plt.xlabel("Time")
    plt.ylabel("Values")
    plt.title("Real-Time Sensor Data")
    plt.xticks(rotation=45)
    plt.legend()
    plt.tight_layout()
    plt.pause(1) # Pause to update the plot

# Main loop to generate and visualize data
plt.ion() # Turn on interactive mode for Matplotlib
print("Starting real-time data simulation... (Press Ctrl+C to stop)")

try:
    while True:
        # Generate a new data point
        timestamp, temperature, pressure, vibration = generate_data()
        anomalies = detect_anomalies(temperature, pressure, vibration)

        # Print anomalies, if any
        if anomalies:
            print(f"Anomalies at {timestamp}: {'', '.join(anomalies)}")

        # Create a new row and add it to the DataFrame
        new_row = pd.DataFrame({
            "timestamp": [timestamp],
            "temperature": [temperature],
            "pressure": [pressure],
            "vibration": [vibration]
        })
        data = pd.concat([data, new_row], ignore_index=True)

        # Keep the DataFrame size manageable (e.g., last 20 points)
        if len(data) > 20:
            data = data.iloc[1:]

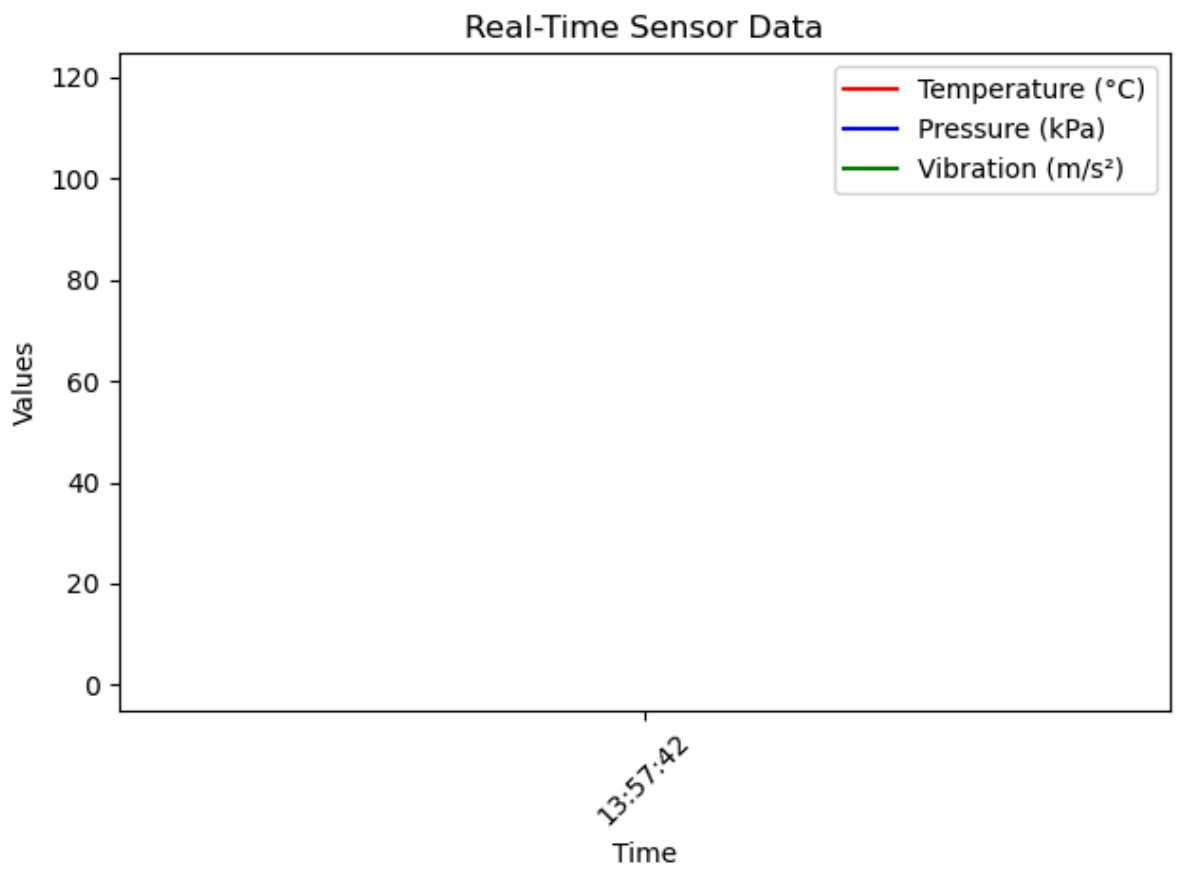
        # Update the plot
        update_and_plot(data)

        # Wait for a second before generating the next data point
        time.sleep(1)

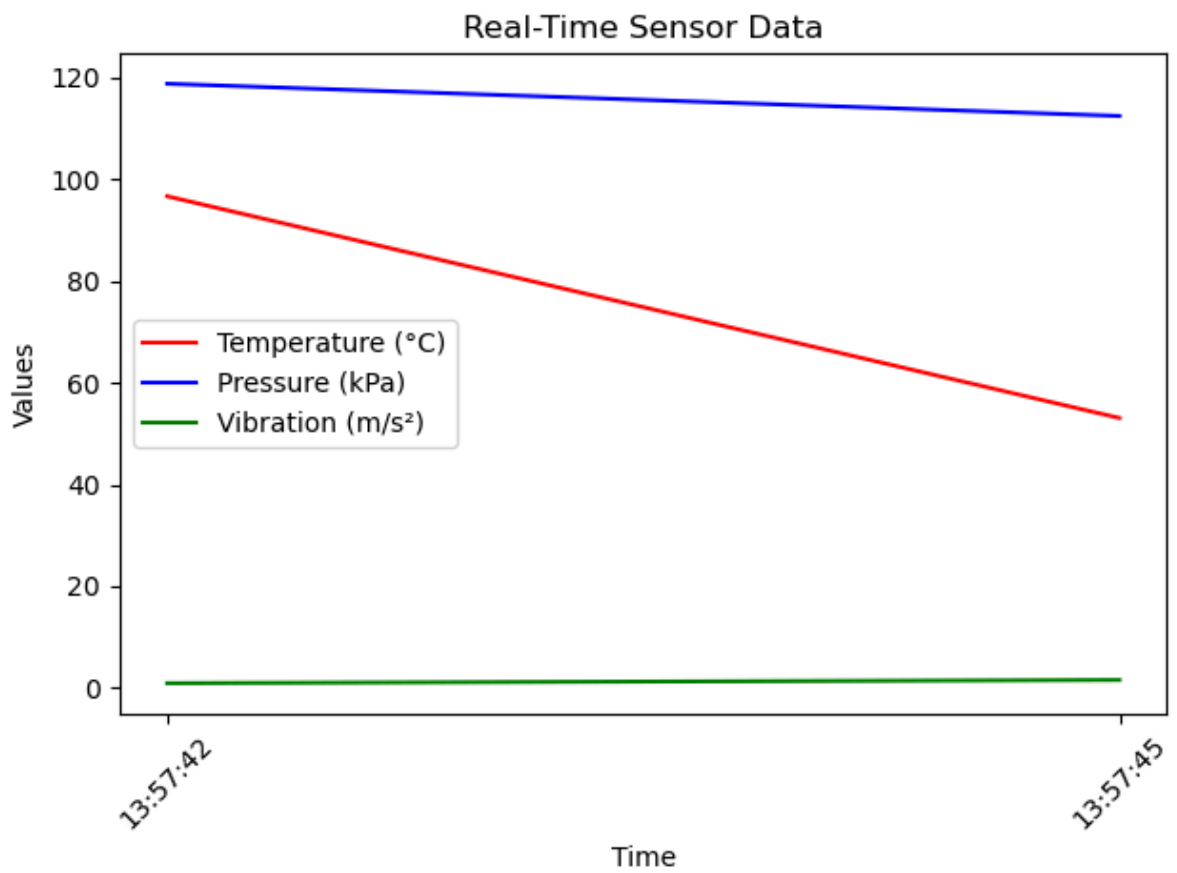
except KeyboardInterrupt:
    print("Simulation stopped.")
    plt.ioff() # Turn off interactive mode
    plt.show()

```

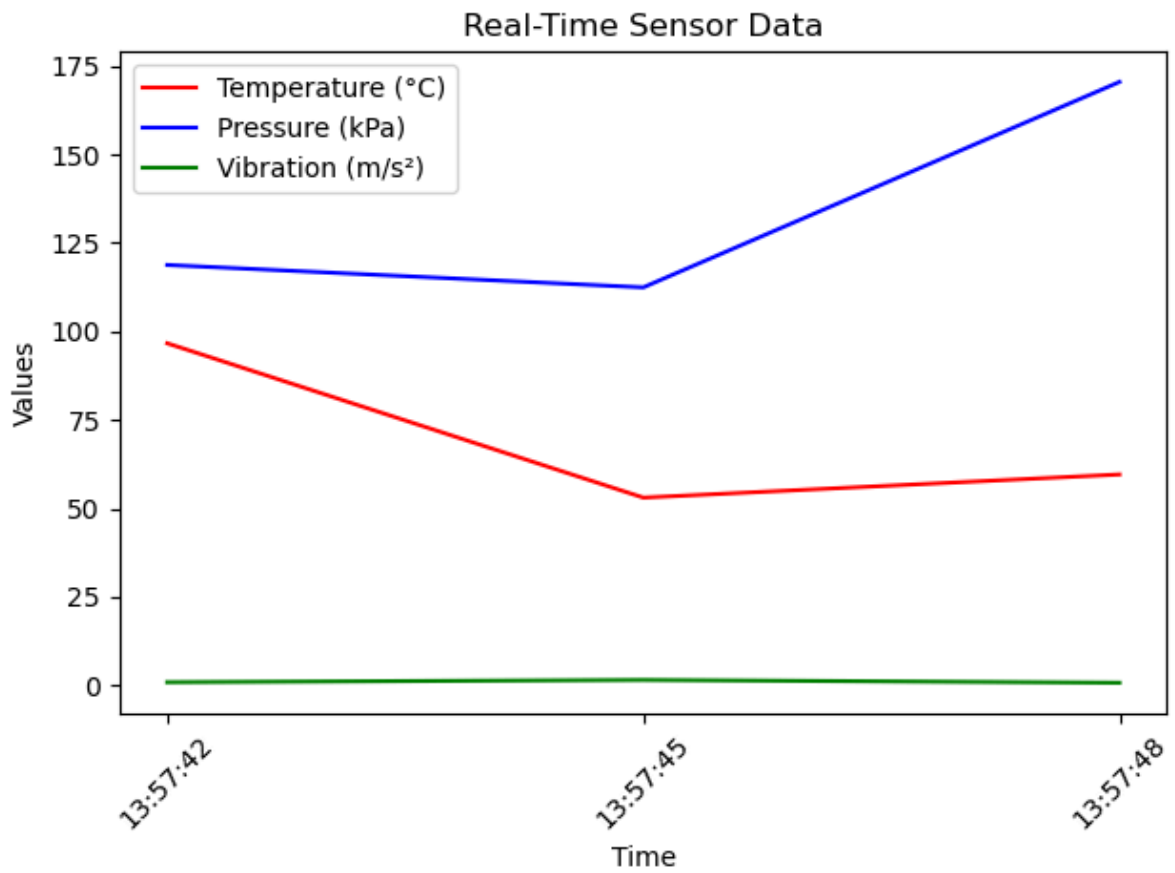
Starting real-time data simulation... (Press Ctrl+C to stop)
Anomalies at 13:57:42: High Temperature



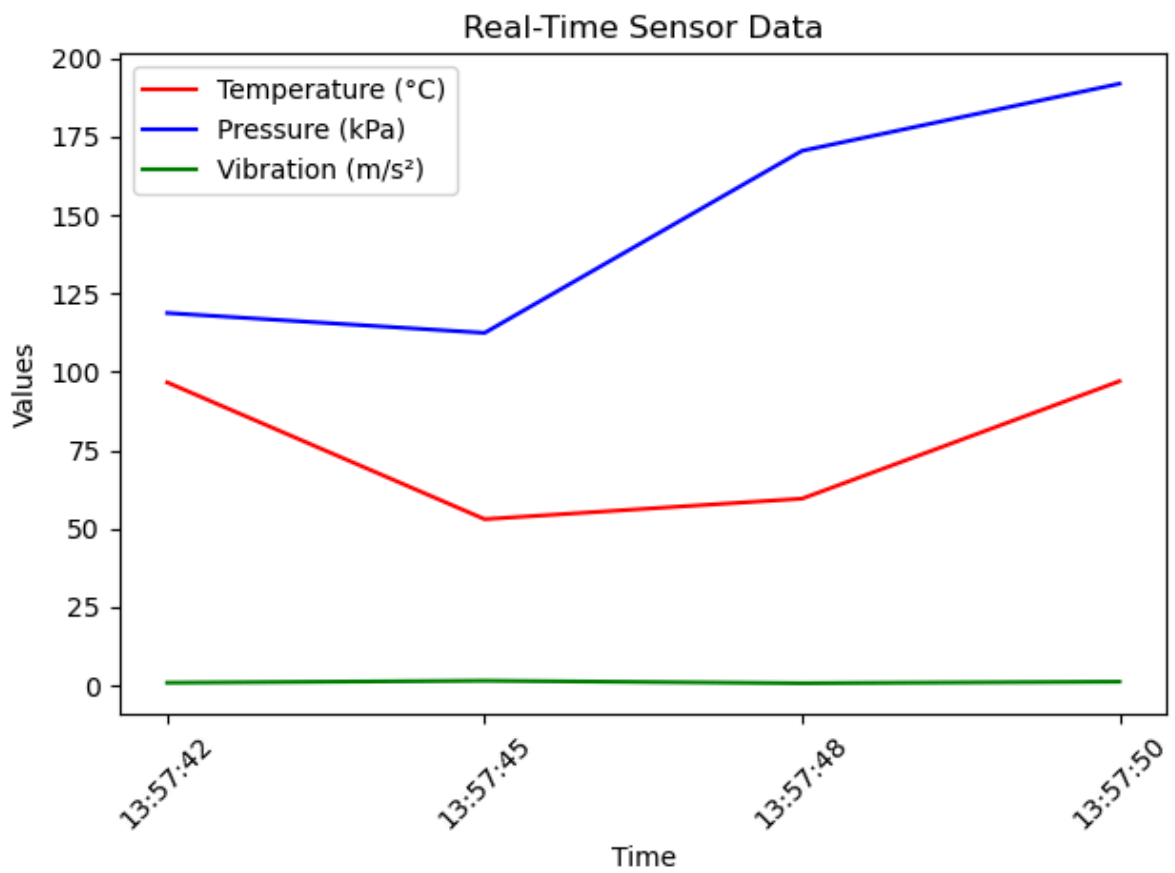
Anomalies at 13:57:45: High Vibration



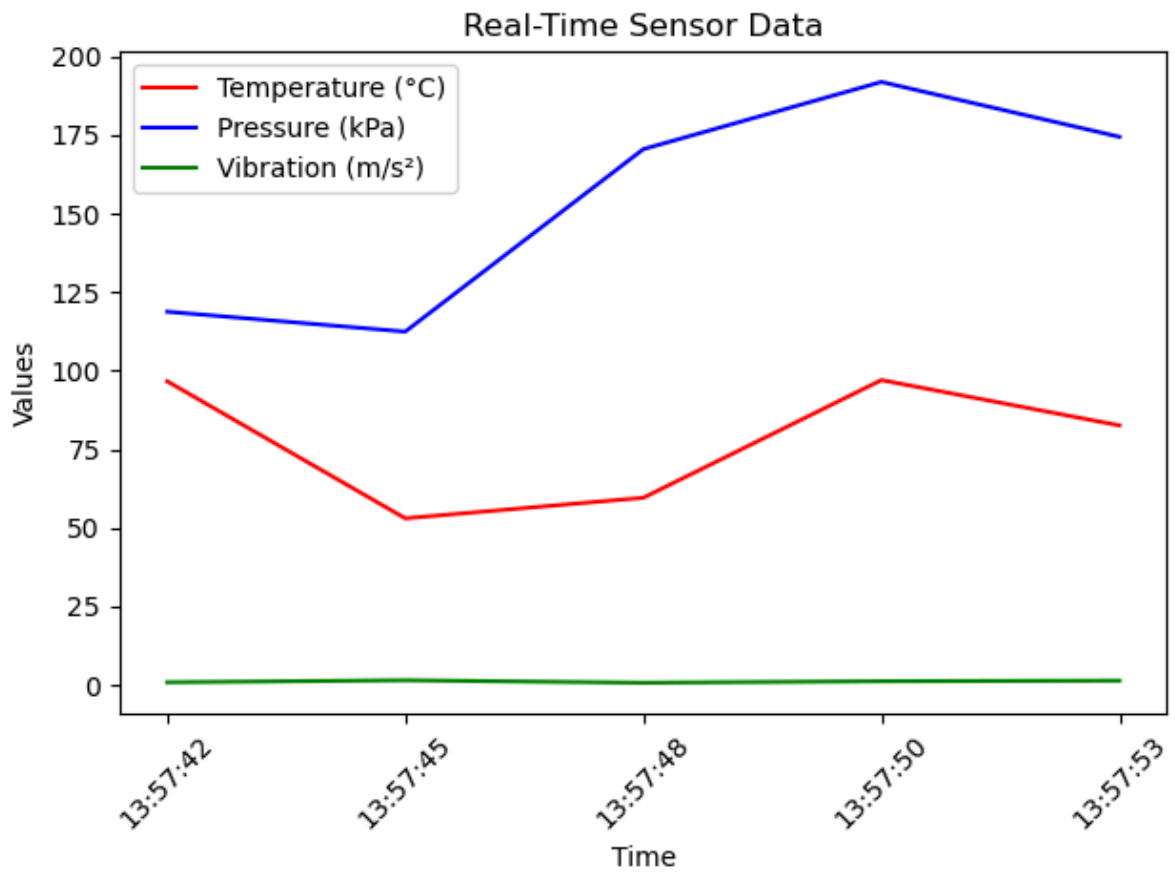
Anomalies at 13:57:48: High Pressure



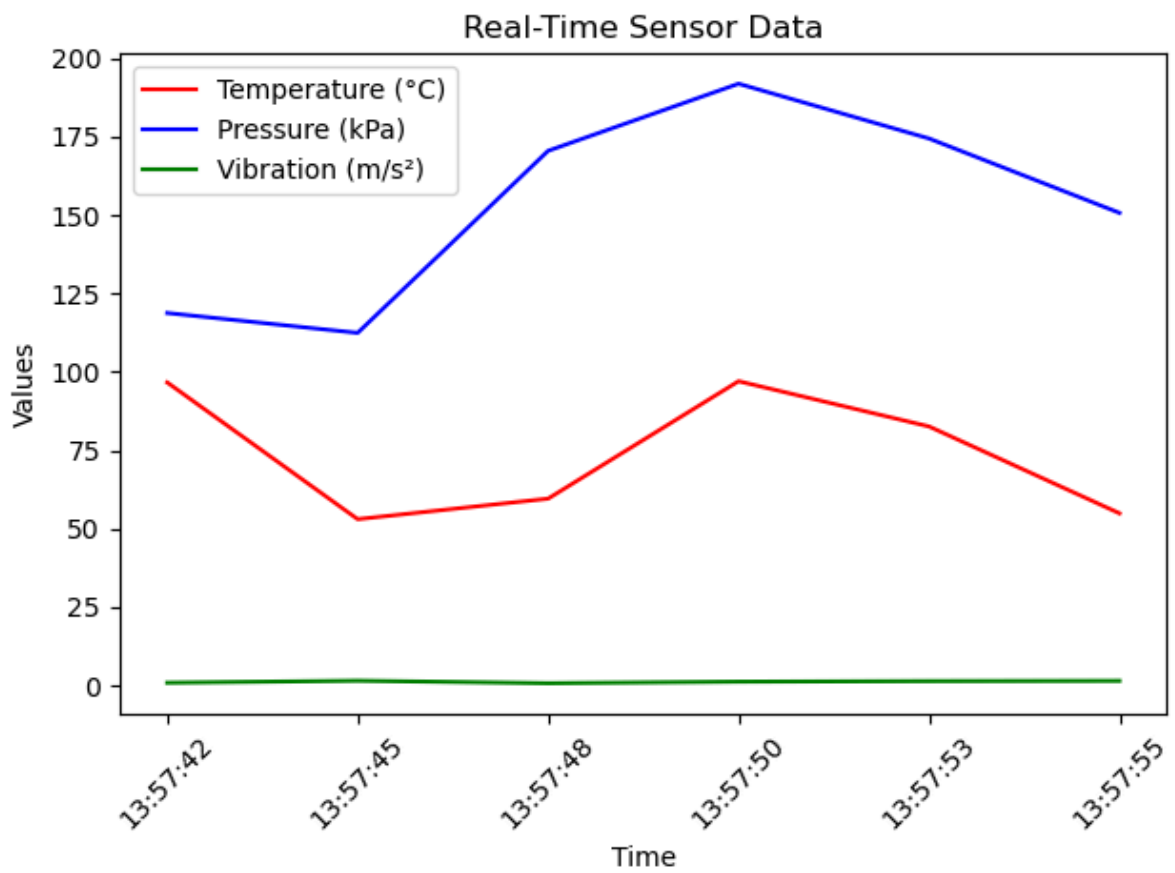
Anomalies at 13:57:50: High Temperature, High Pressure



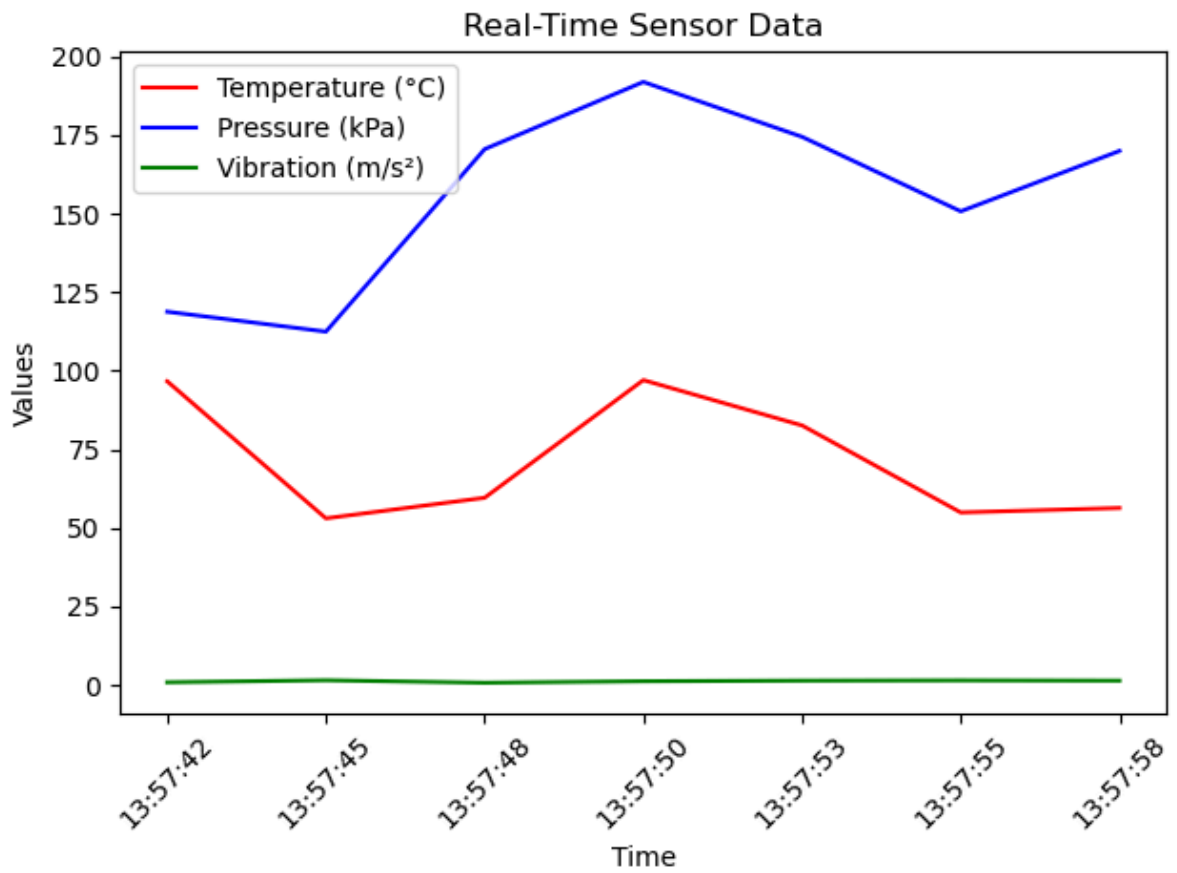
Anomalies at 13:57:53: High Temperature, High Pressure



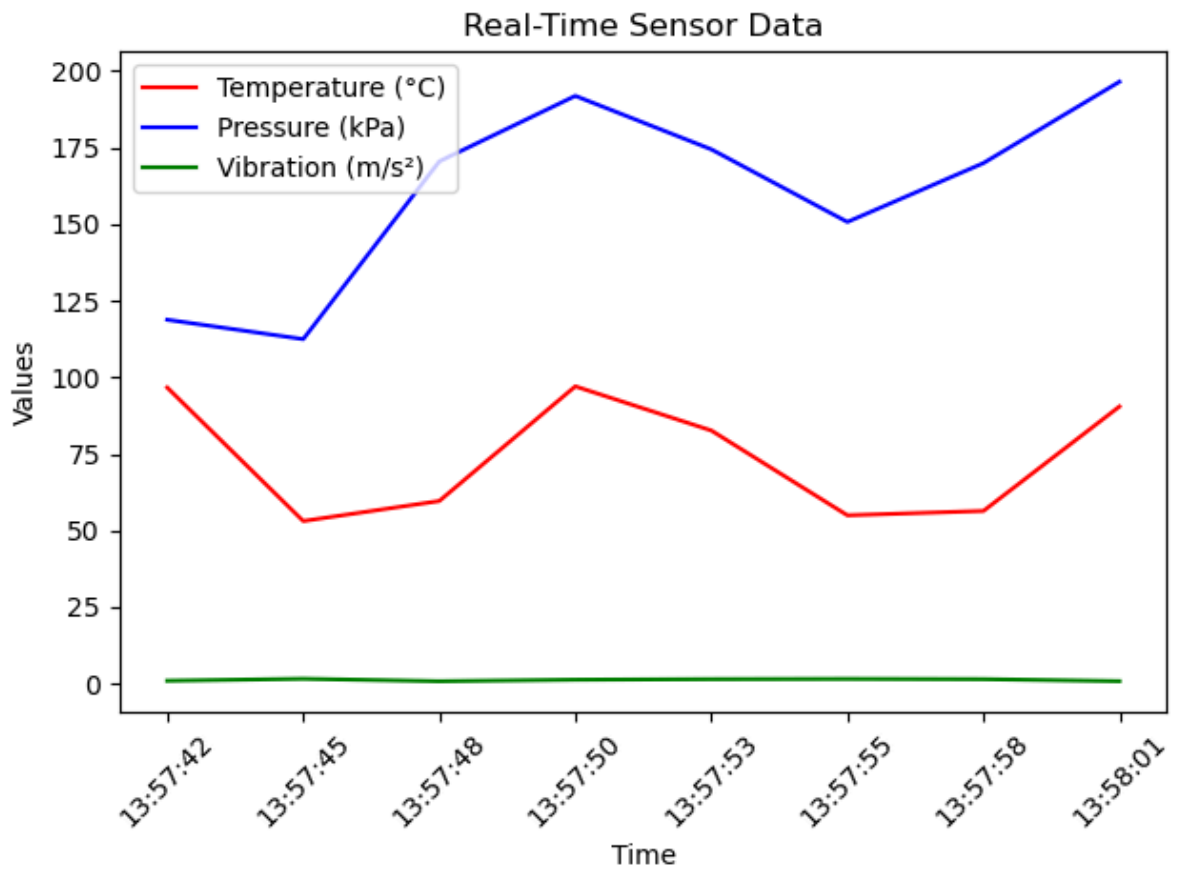
Anomalies at 13:57:55: High Pressure, High Vibration



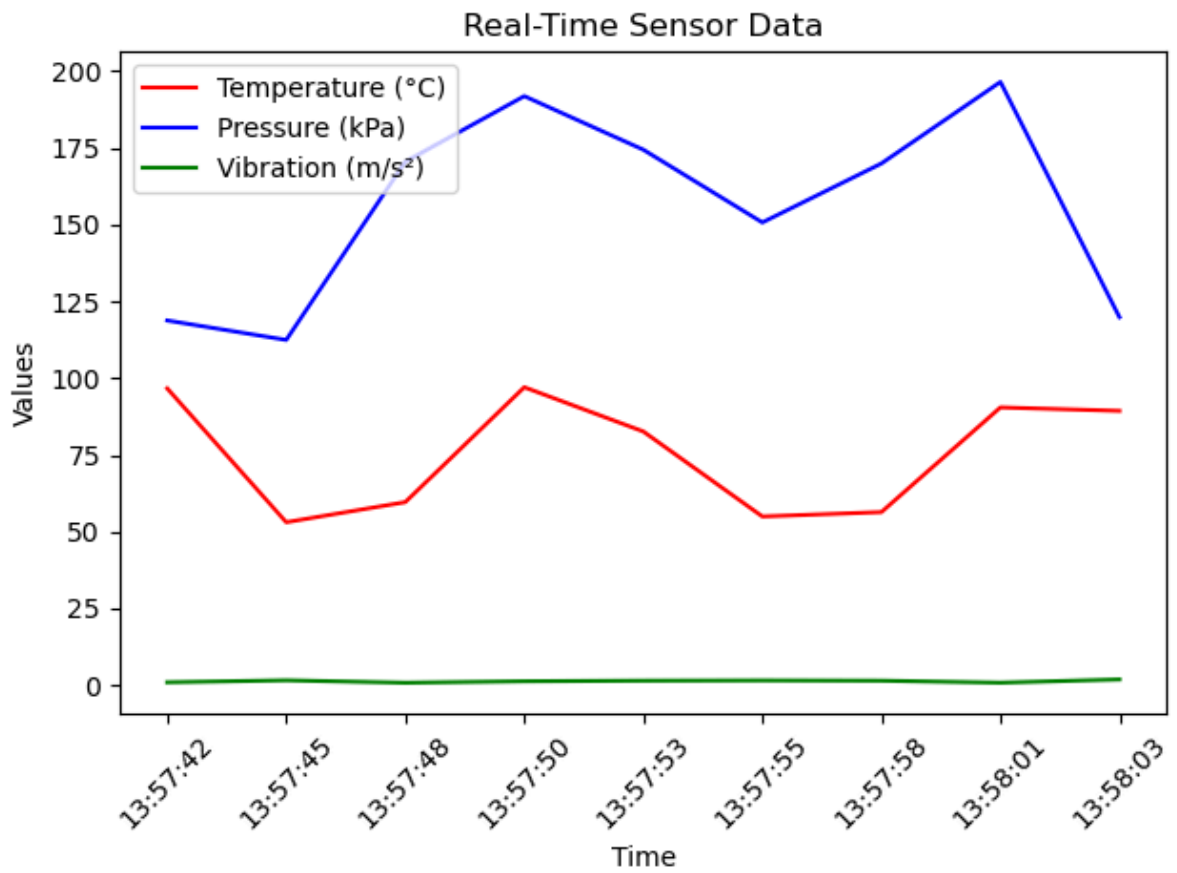
Anomalies at 13:57:58: High Pressure



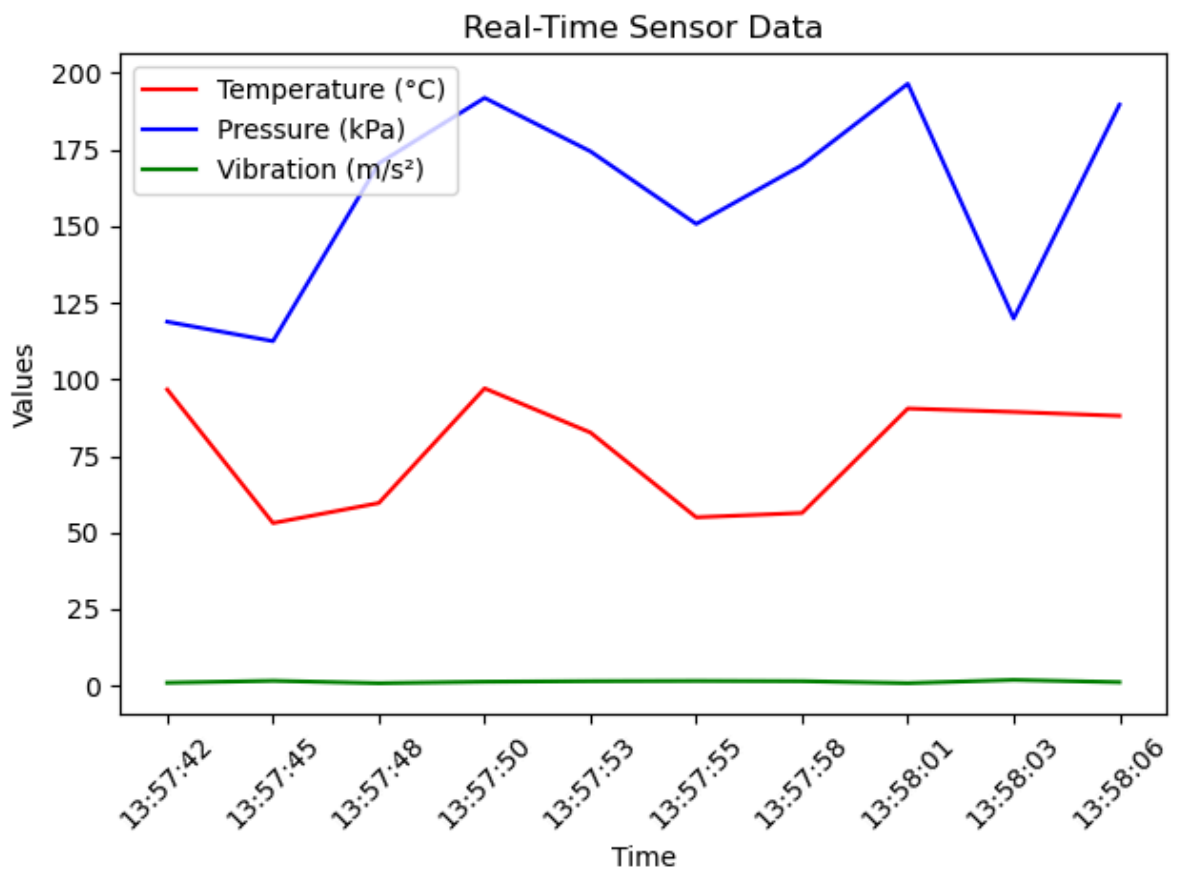
Anomalies at 13:58:01: High Temperature, High Pressure

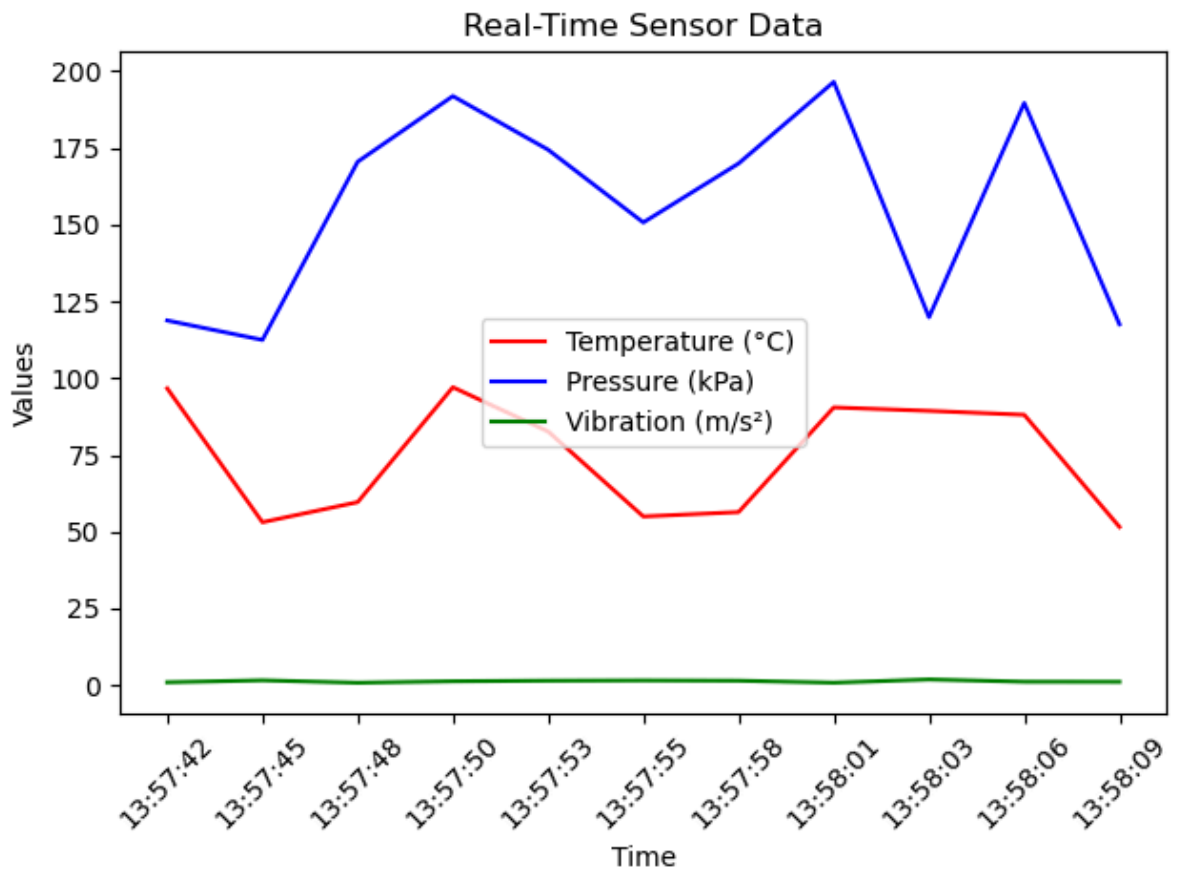


Anomalies at 13:58:03: High Temperature, High Vibration

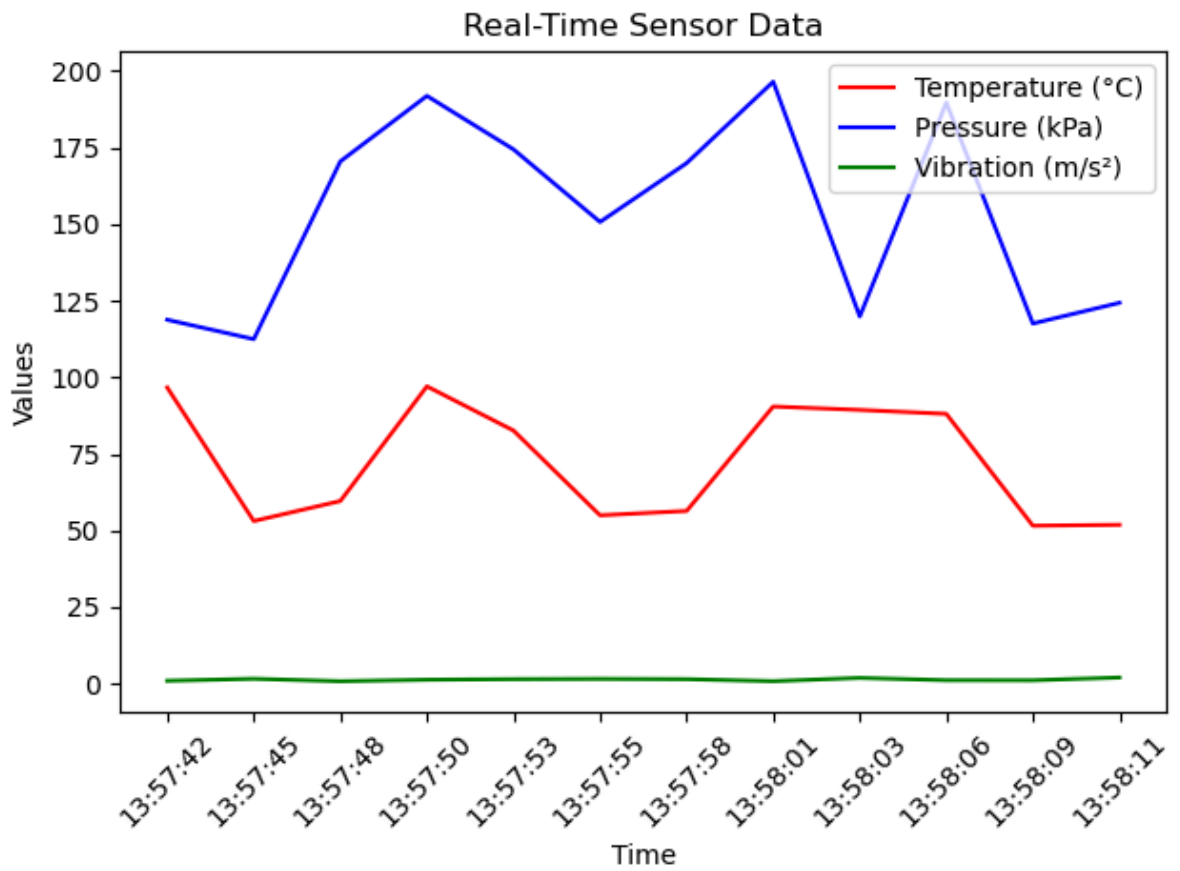


Anomalies at 13:58:06: High Temperature, High Pressure

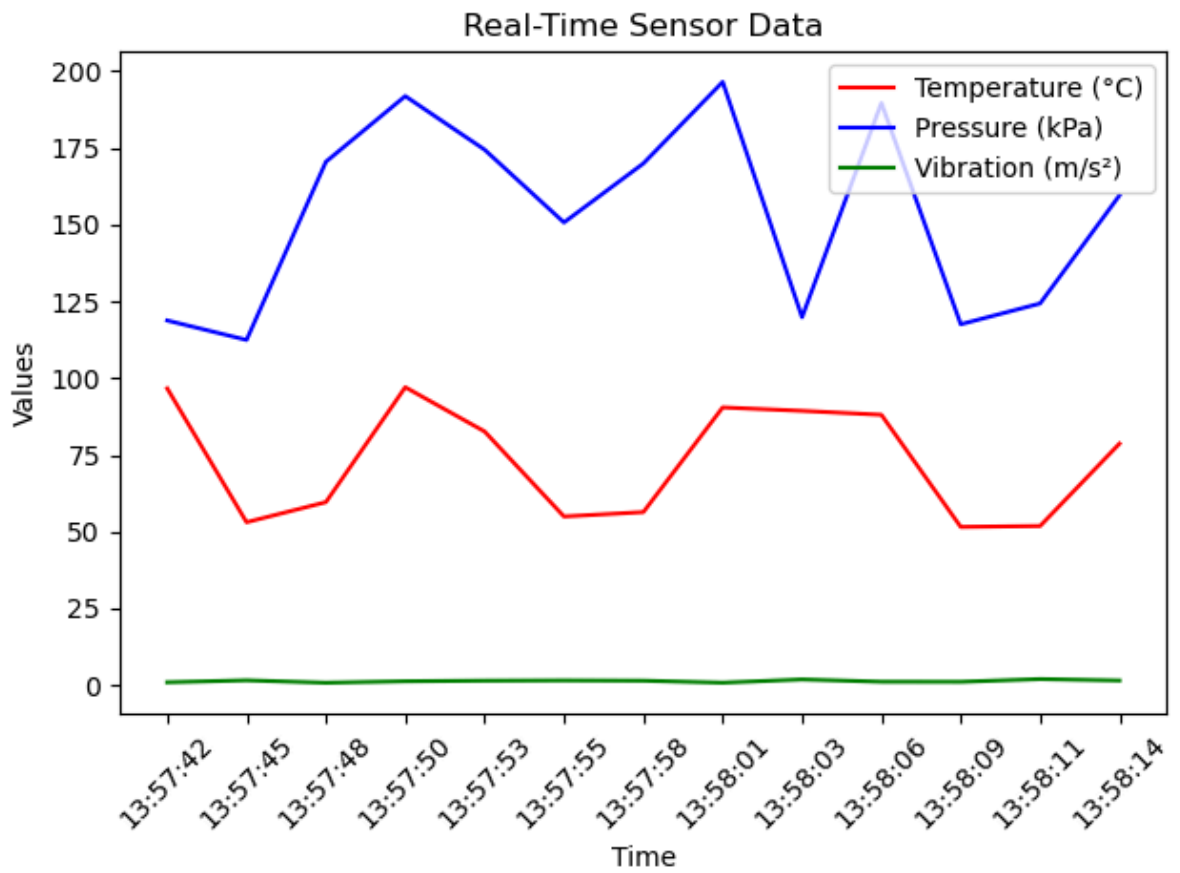




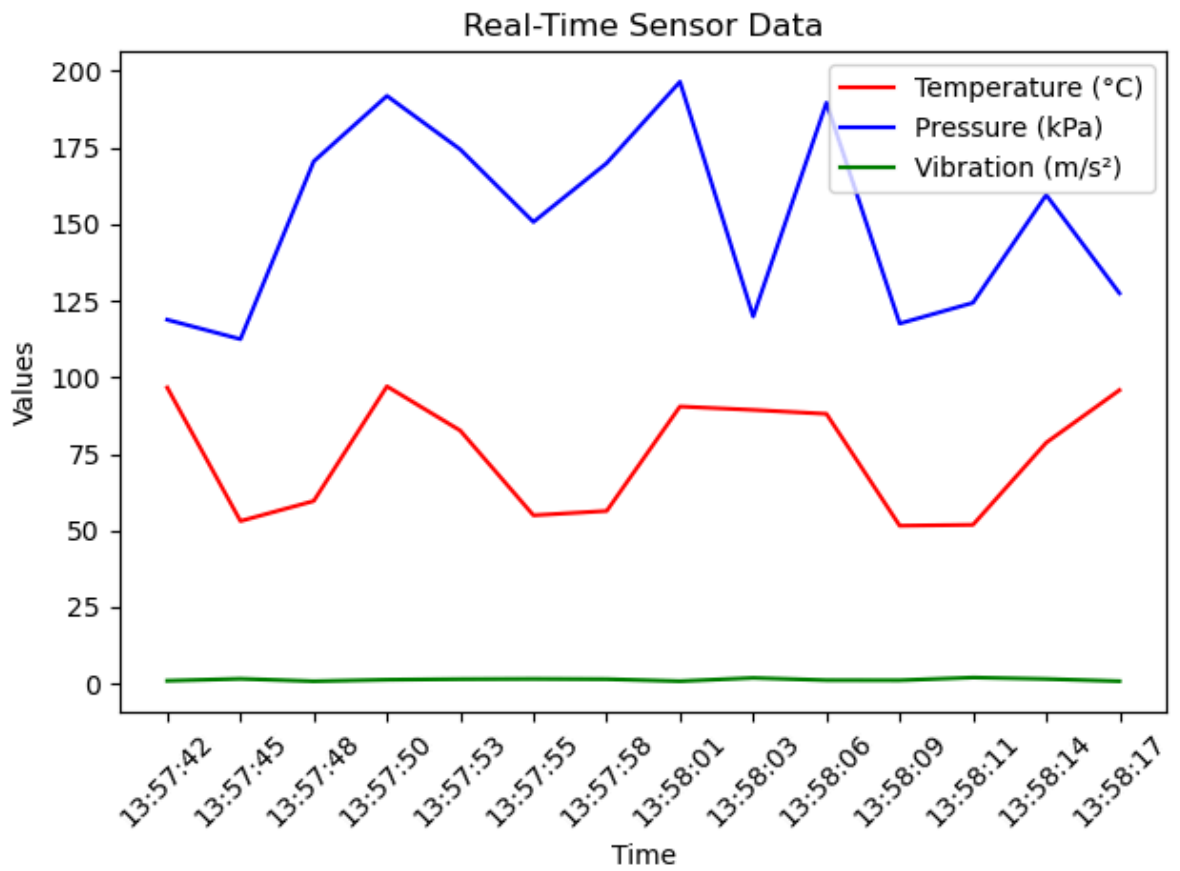
Anomalies at 13:58:11: High Vibration

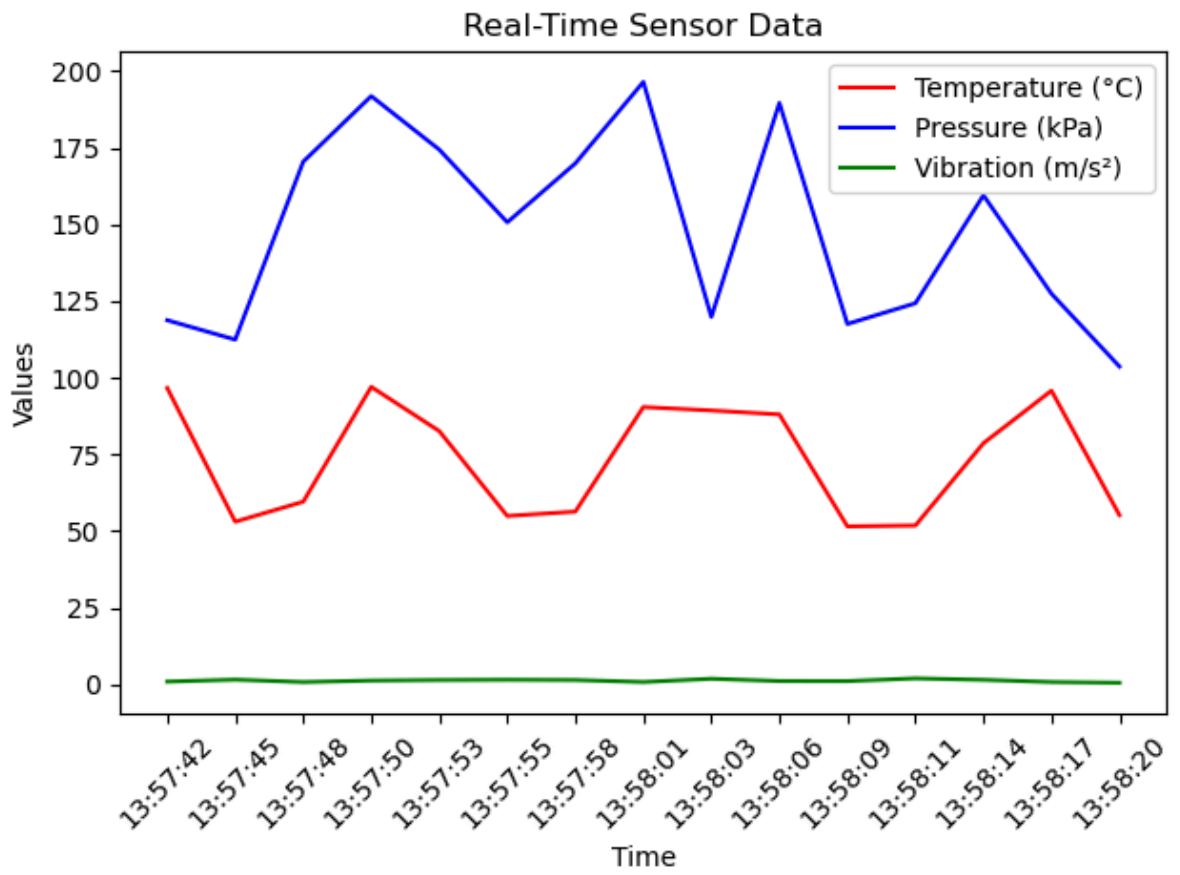


Anomalies at 13:58:14: High Pressure, High Vibration

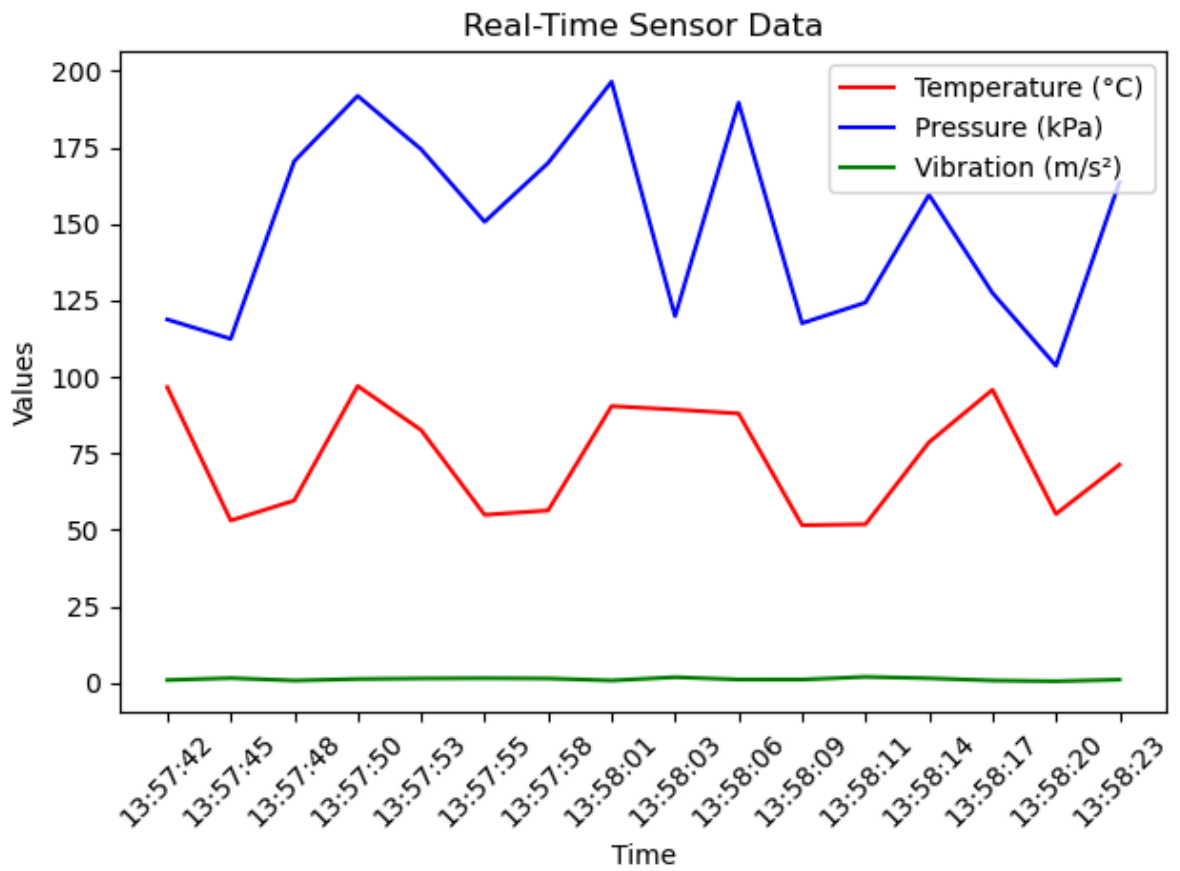


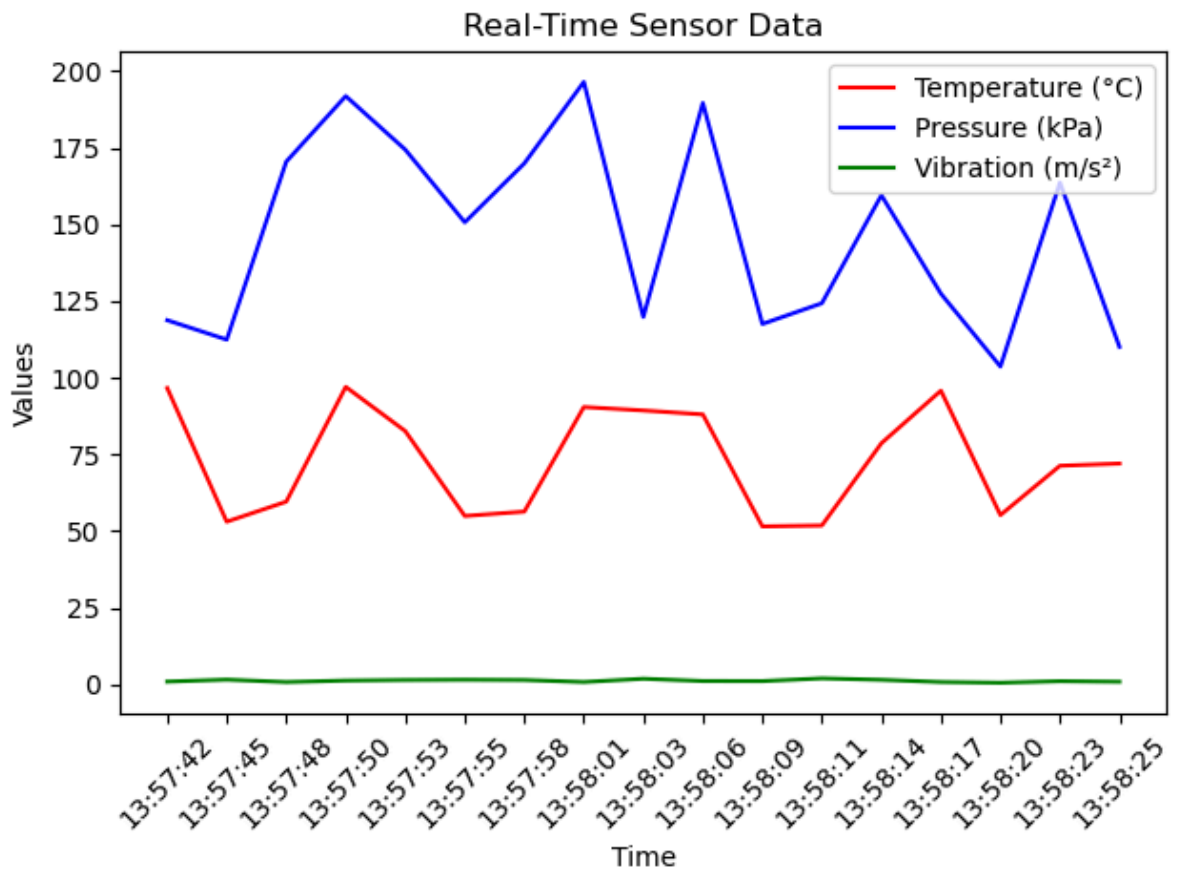
Anomalies at 13:58:17: High Temperature



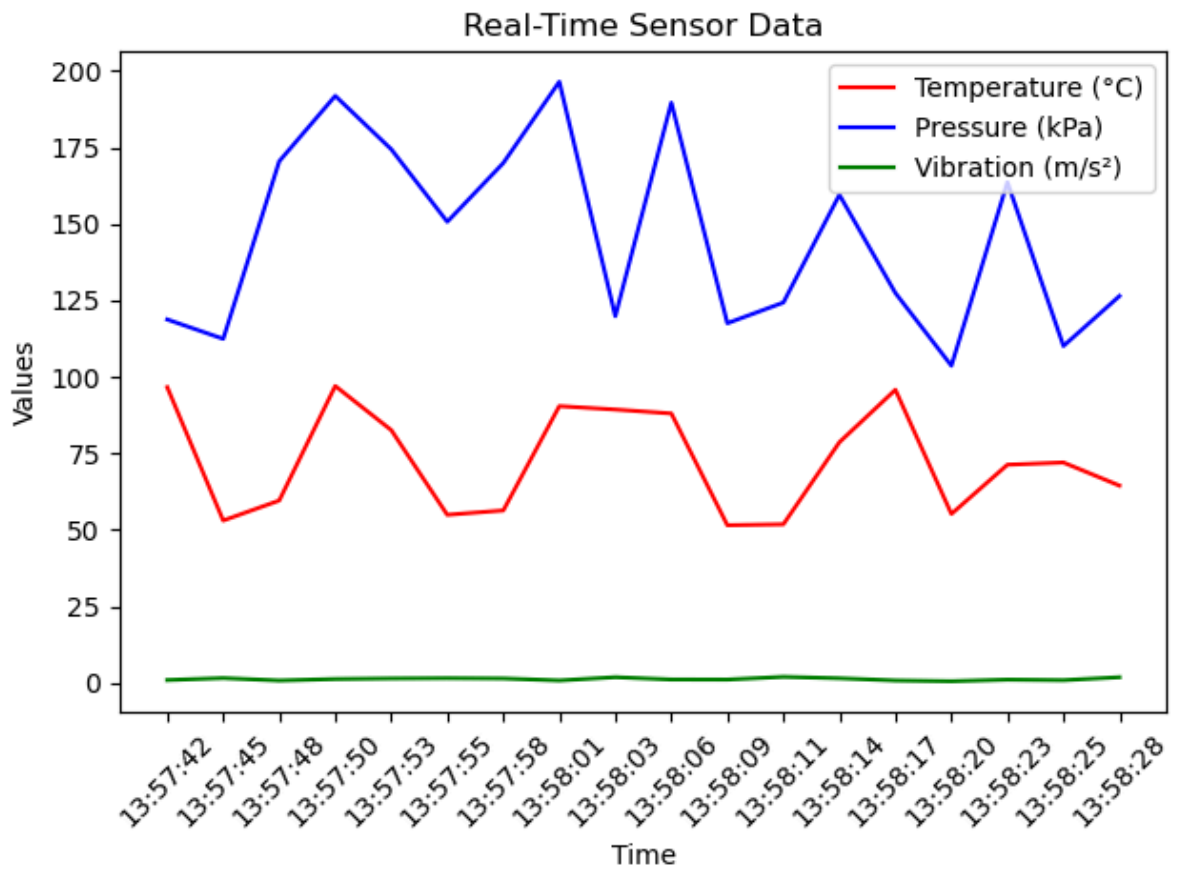


Anomalies at 13:58:23: High Pressure

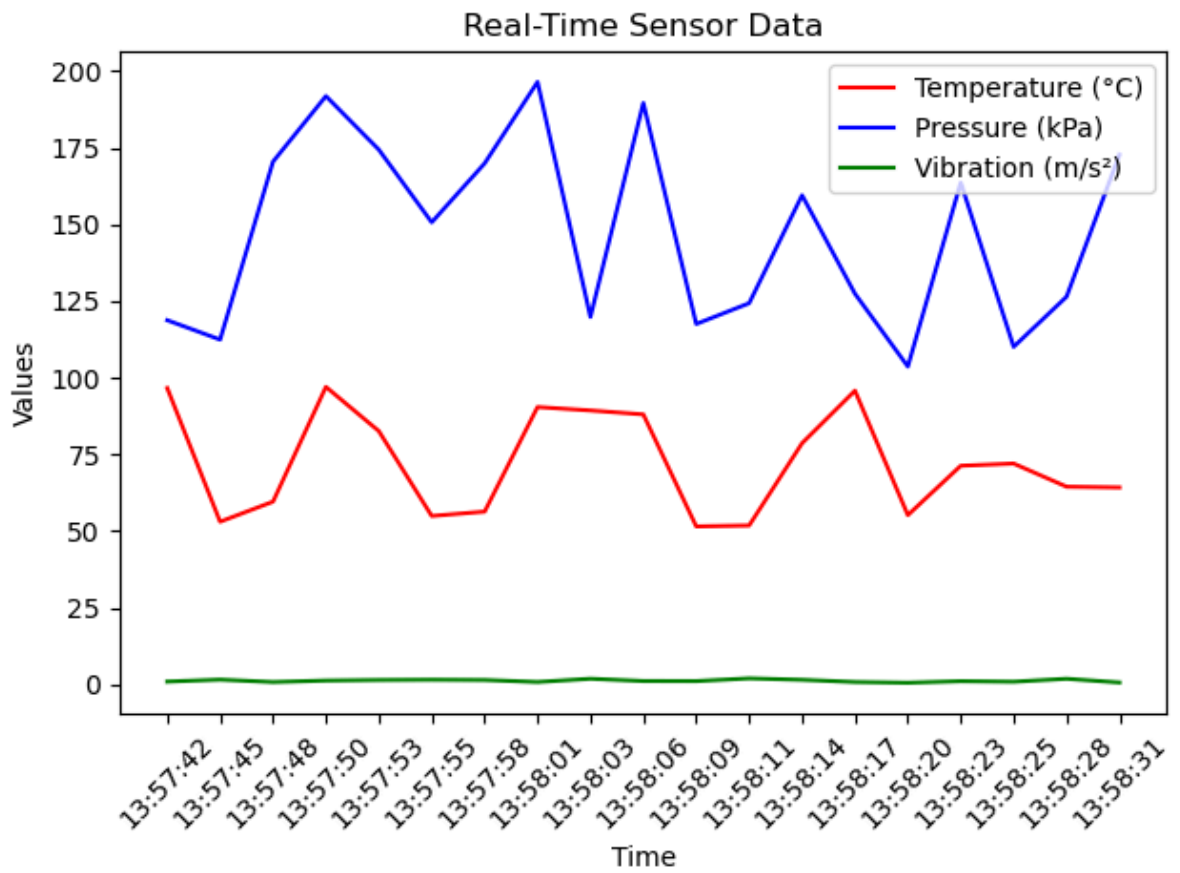




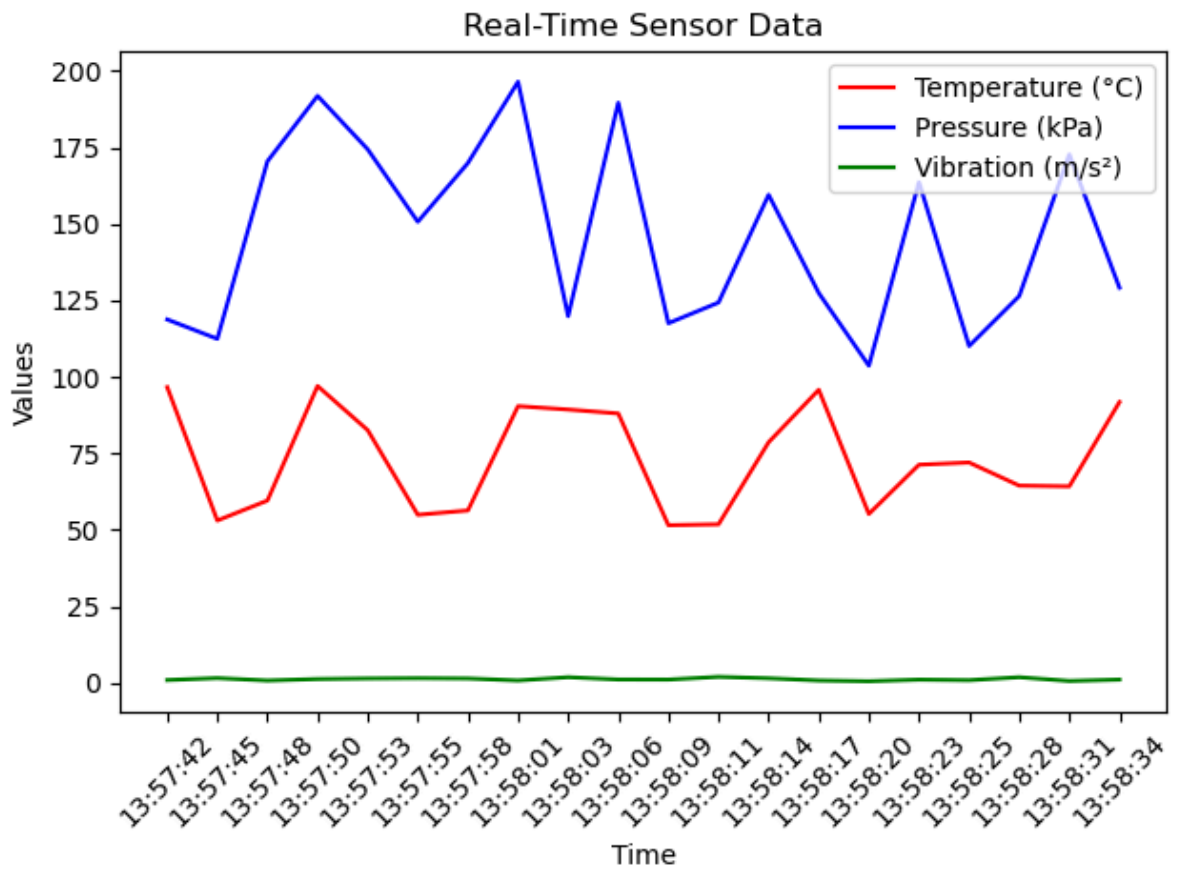
Anomalies at 13:58:28: High Vibration



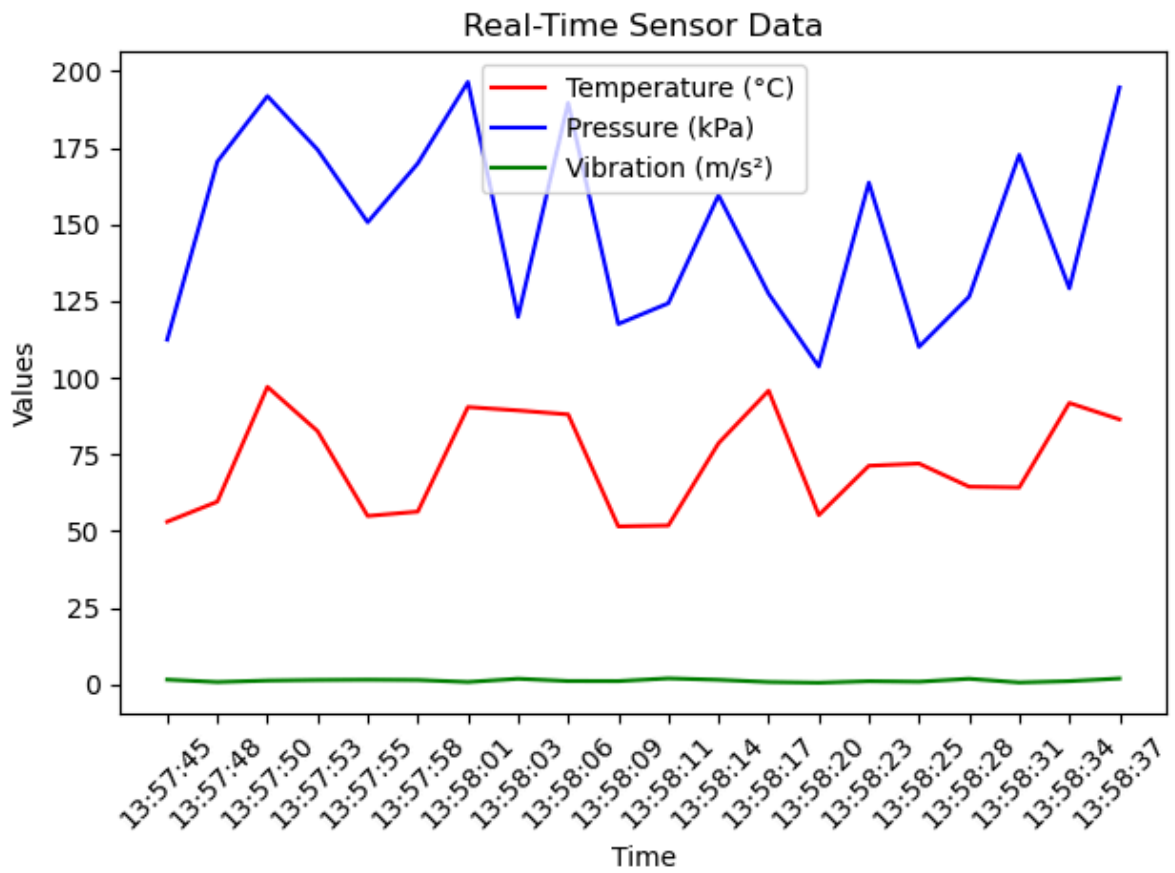
Anomalies at 13:58:31: High Pressure



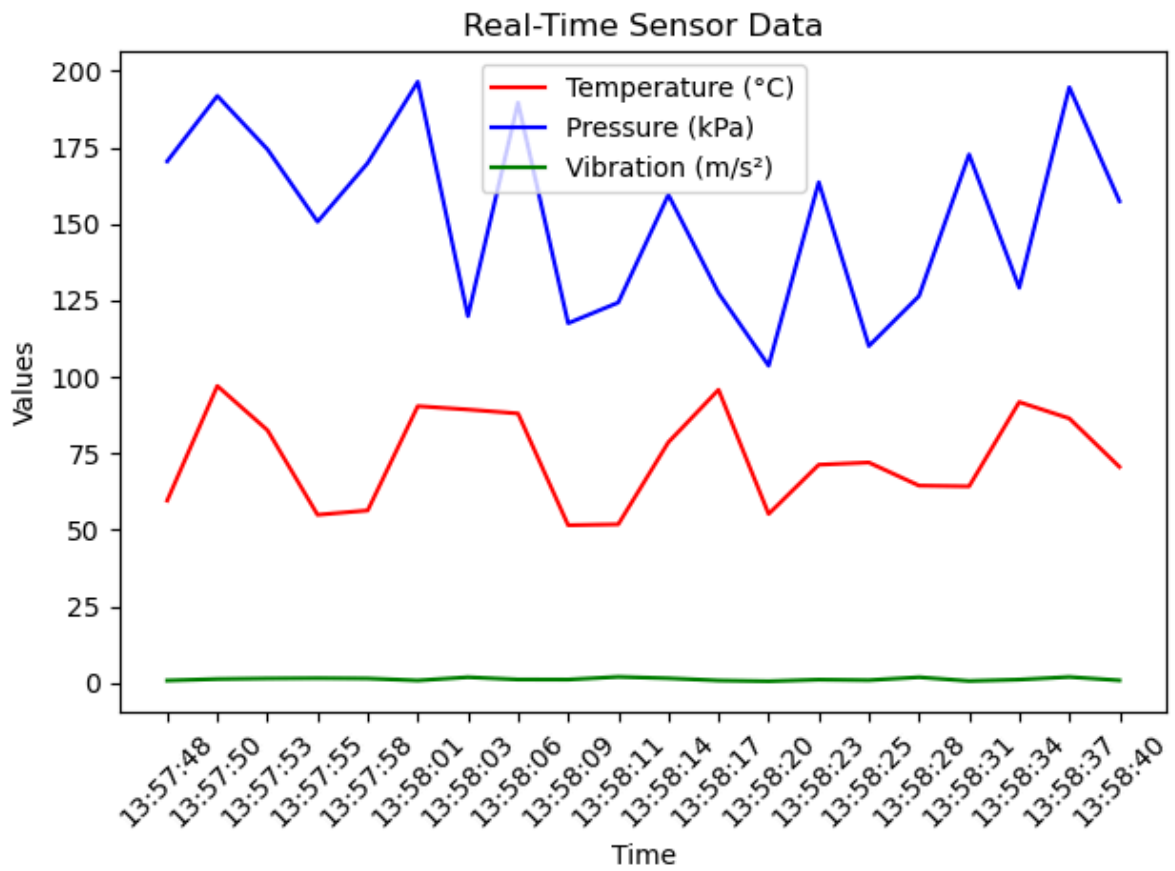
Anomalies at 13:58:34: High Temperature

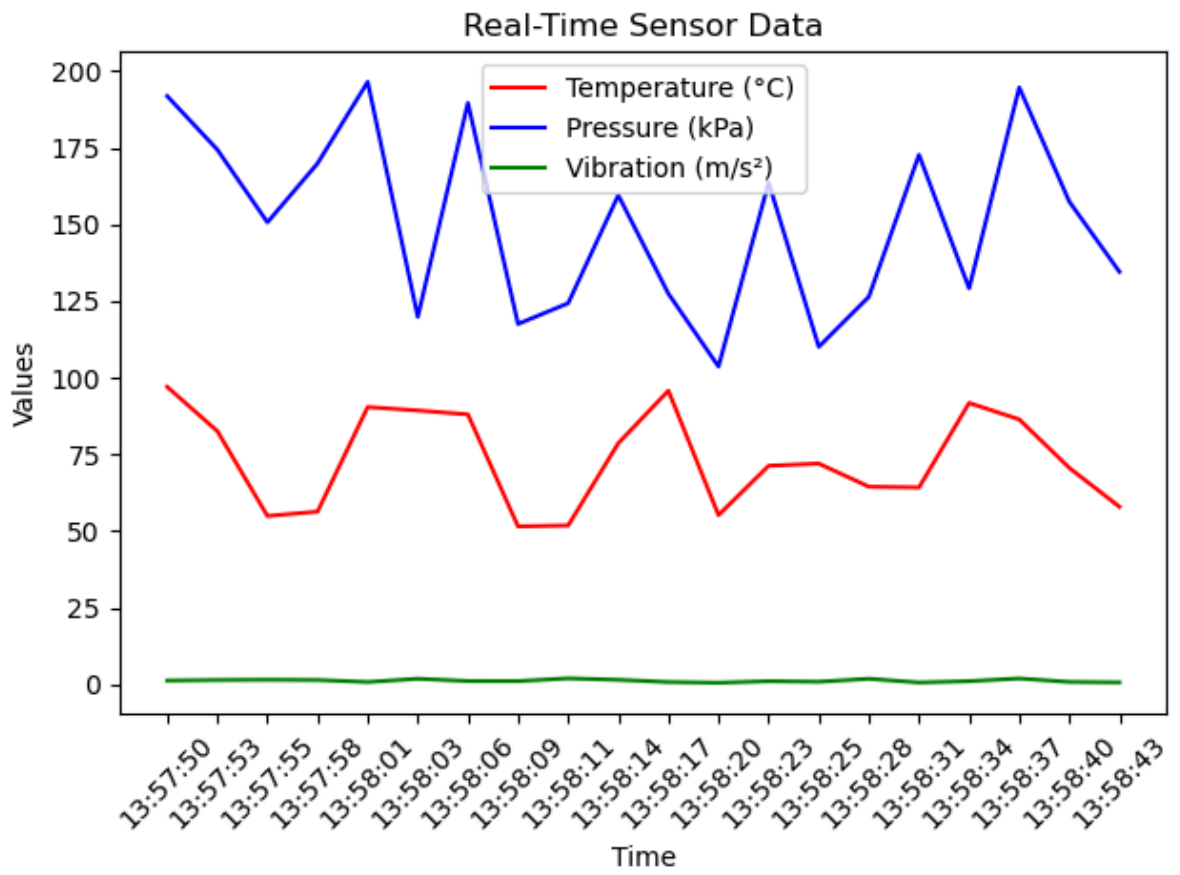


Anomalies at 13:58:37: High Temperature, High Pressure, High Vibration

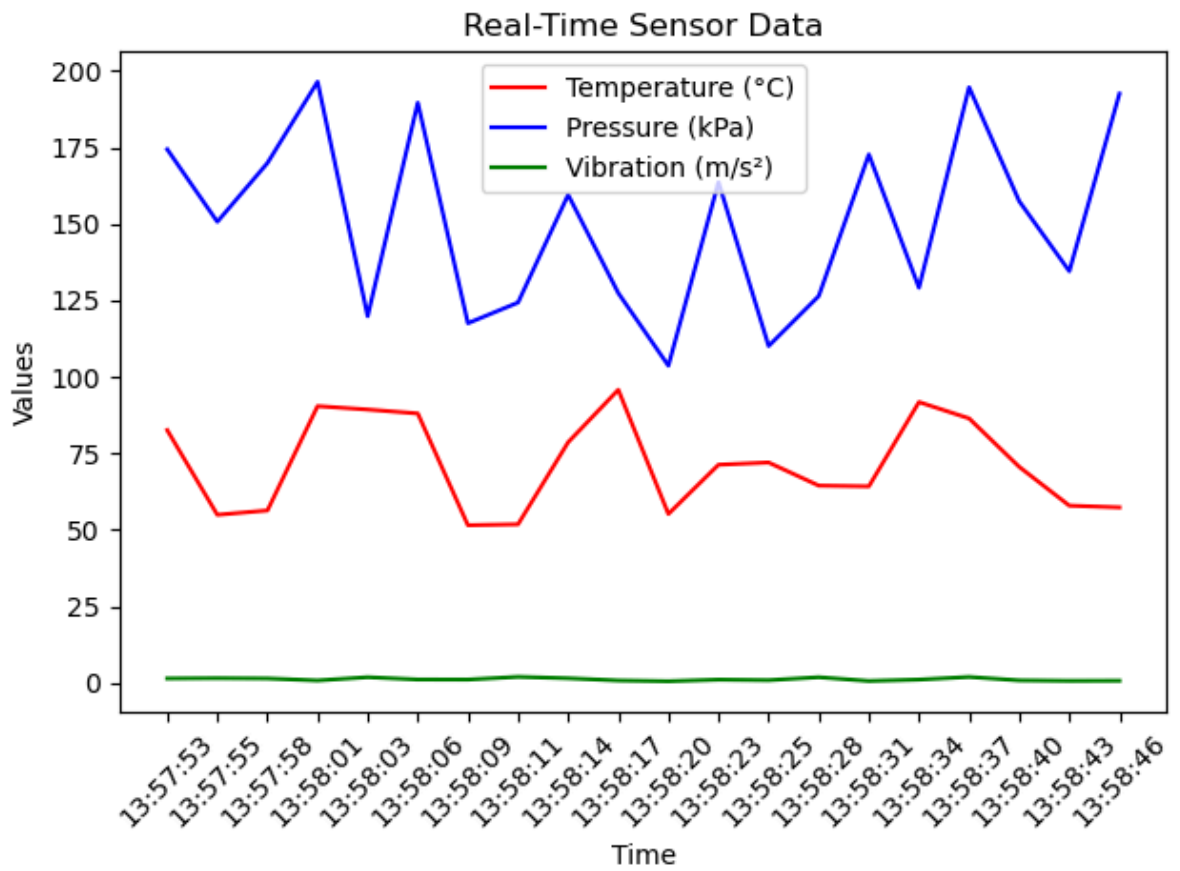


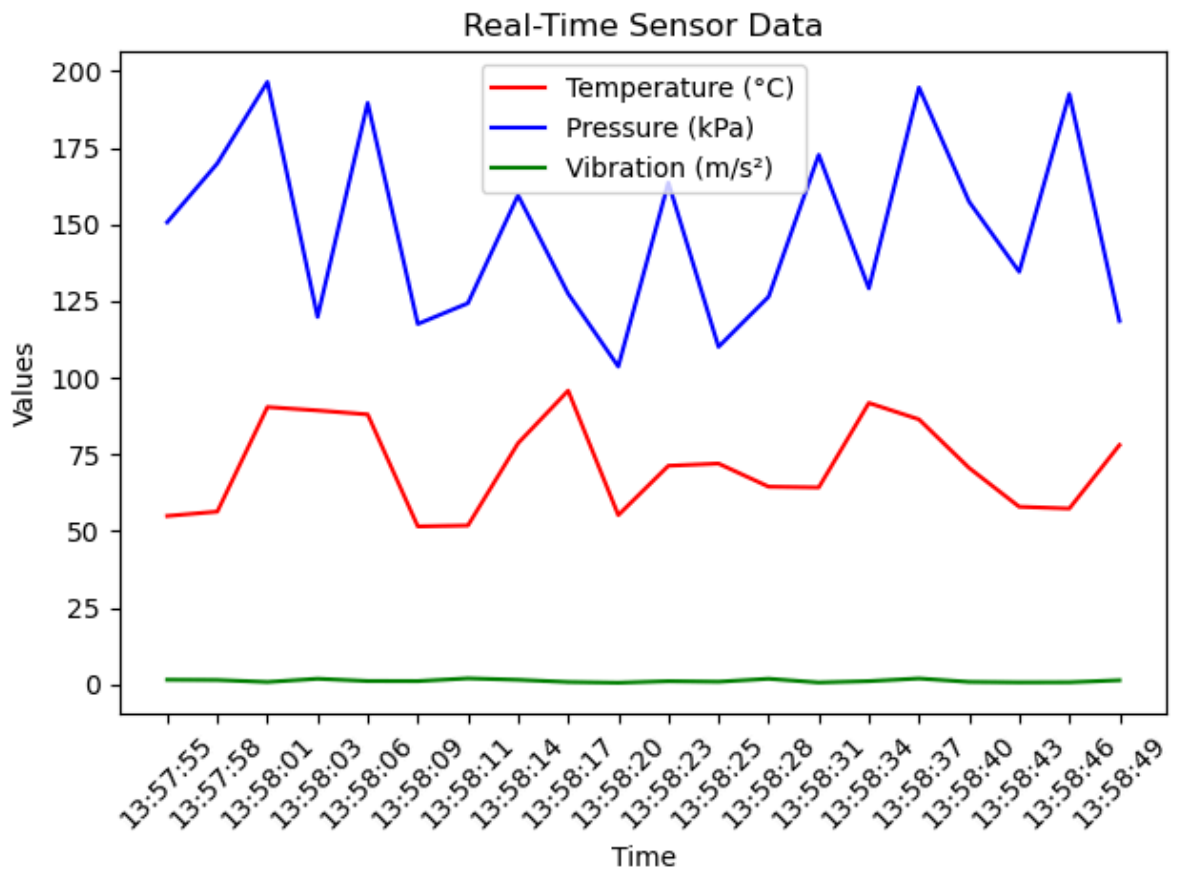
Anomalies at 13:58:40: High Pressure



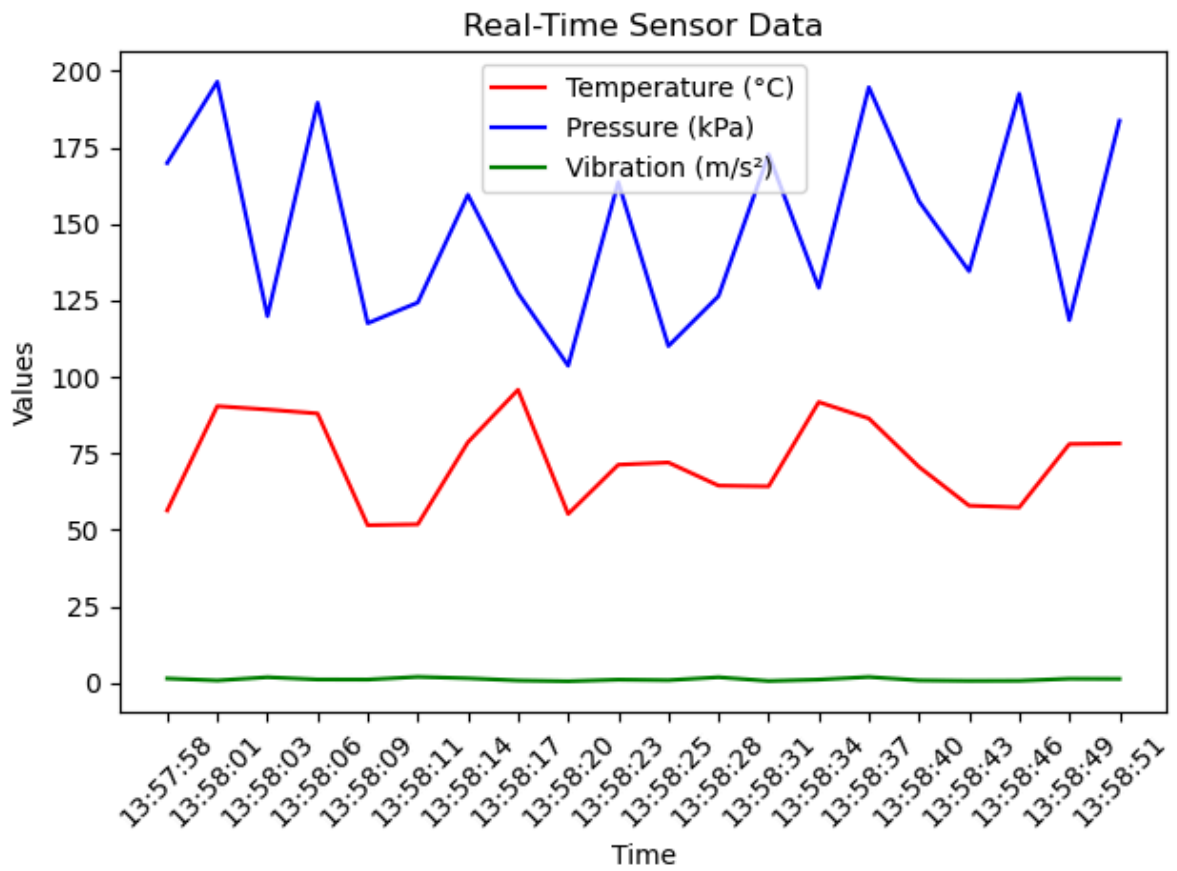


Anomalies at 13:58:46: High Pressure

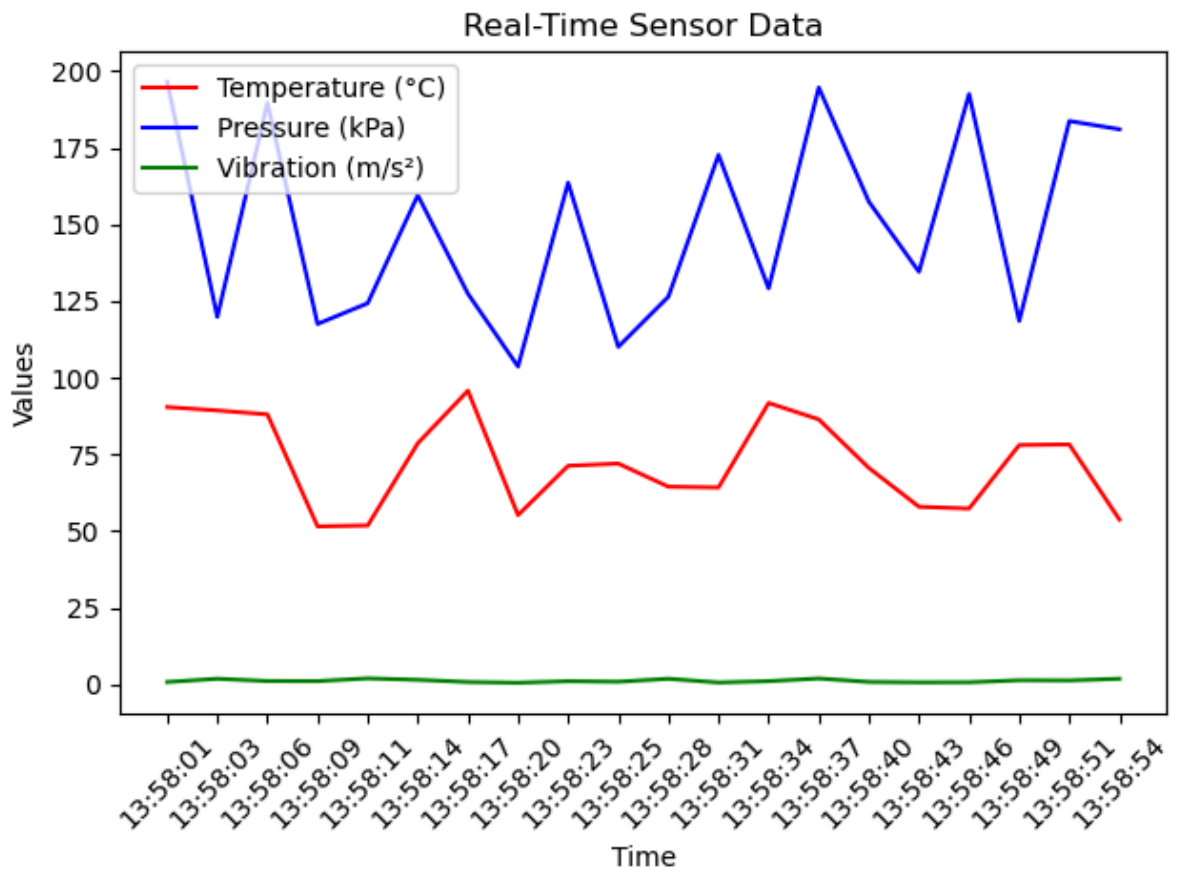




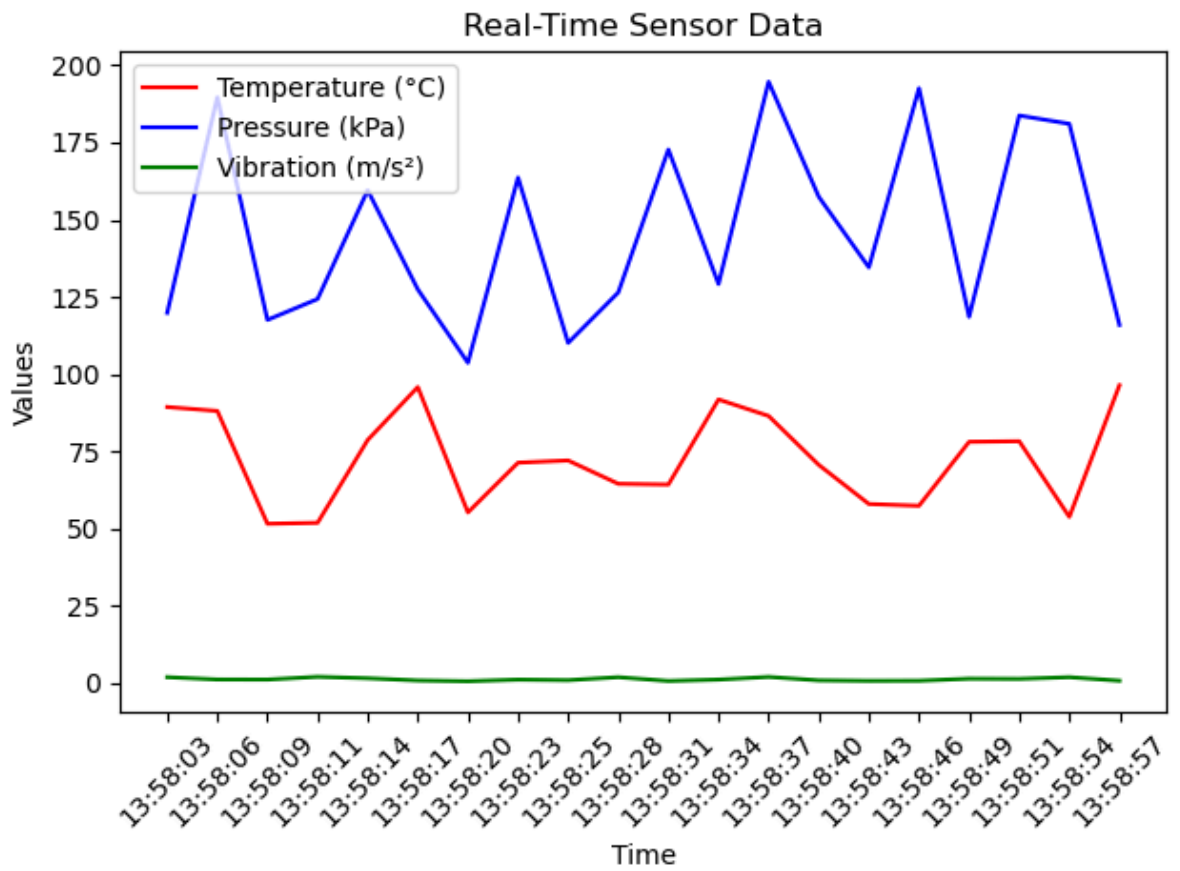
Anomalies at 13:58:51: High Pressure



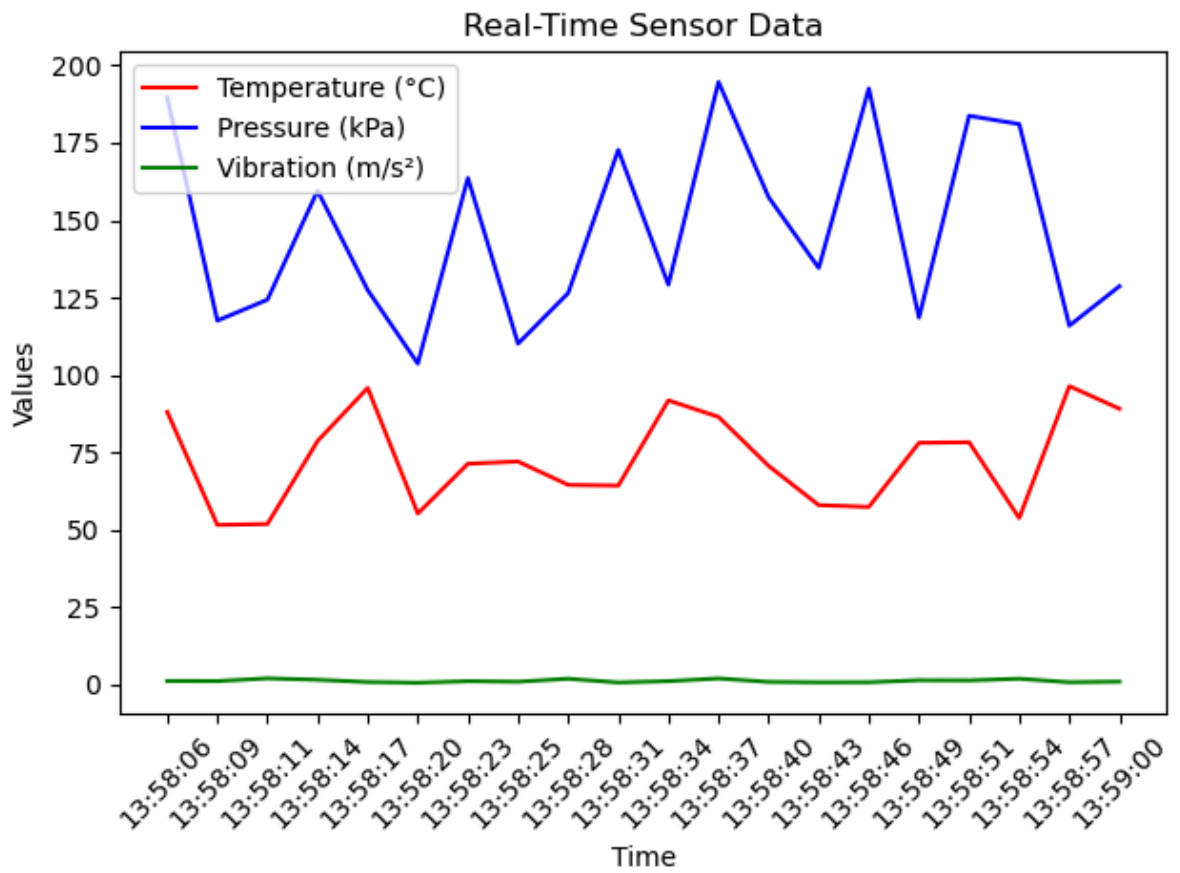
Anomalies at 13:58:54: High Pressure, High Vibration



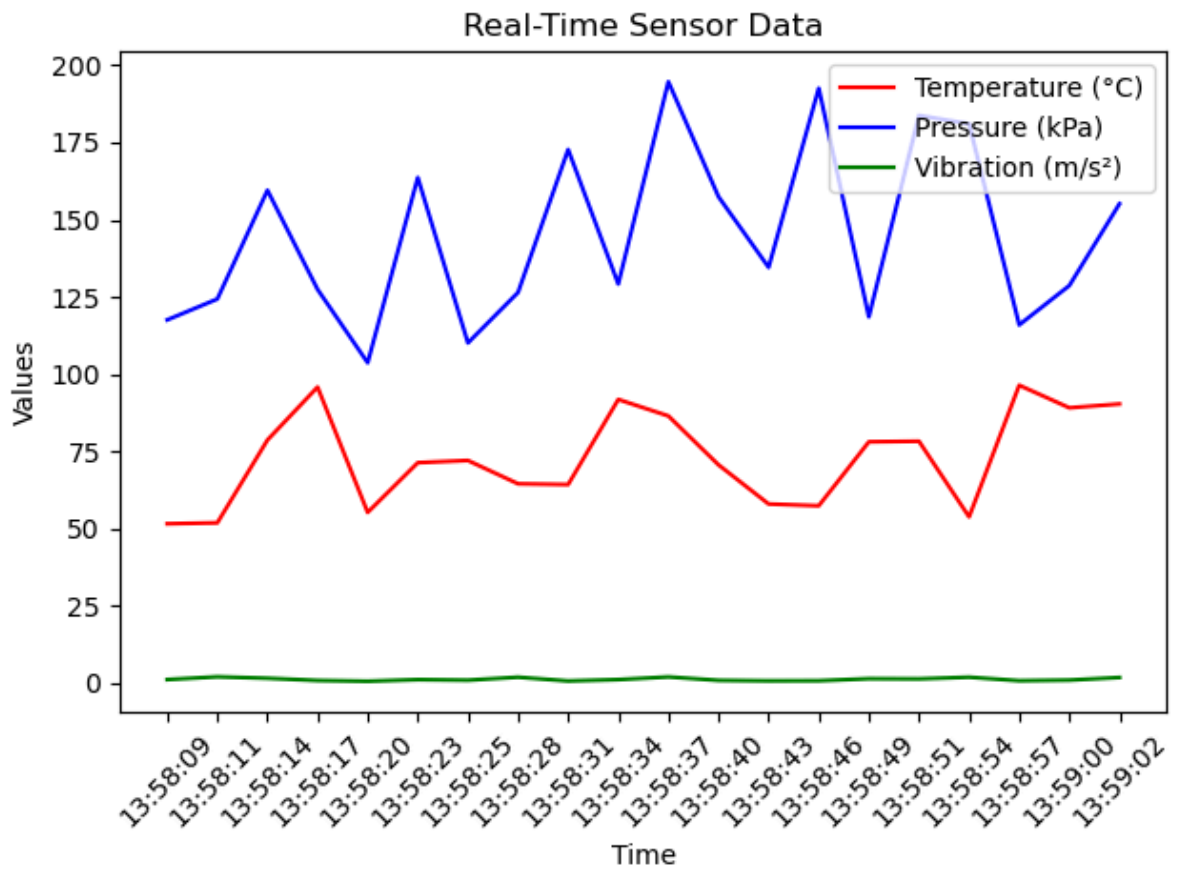
Anomalies at 13:58:57: High Temperature



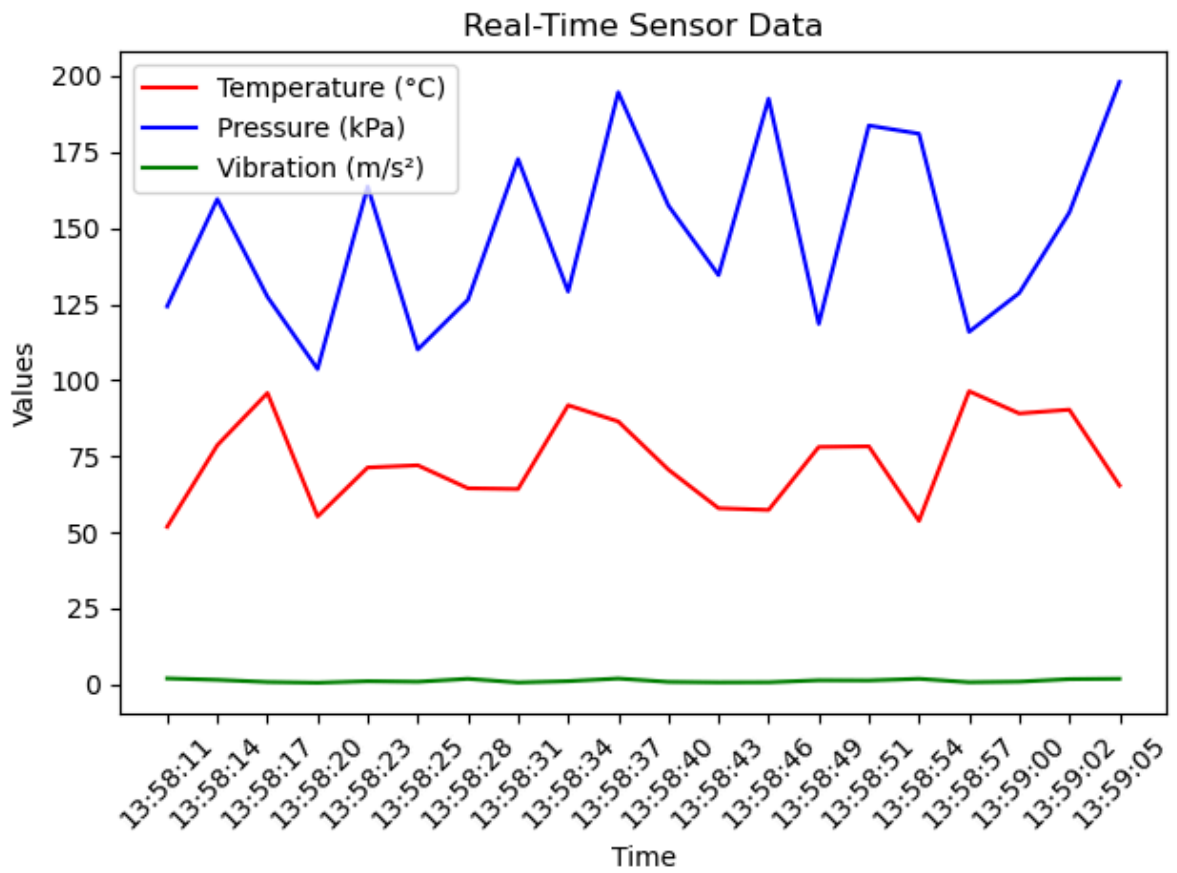
Anomalies at 13:59:00: High Temperature



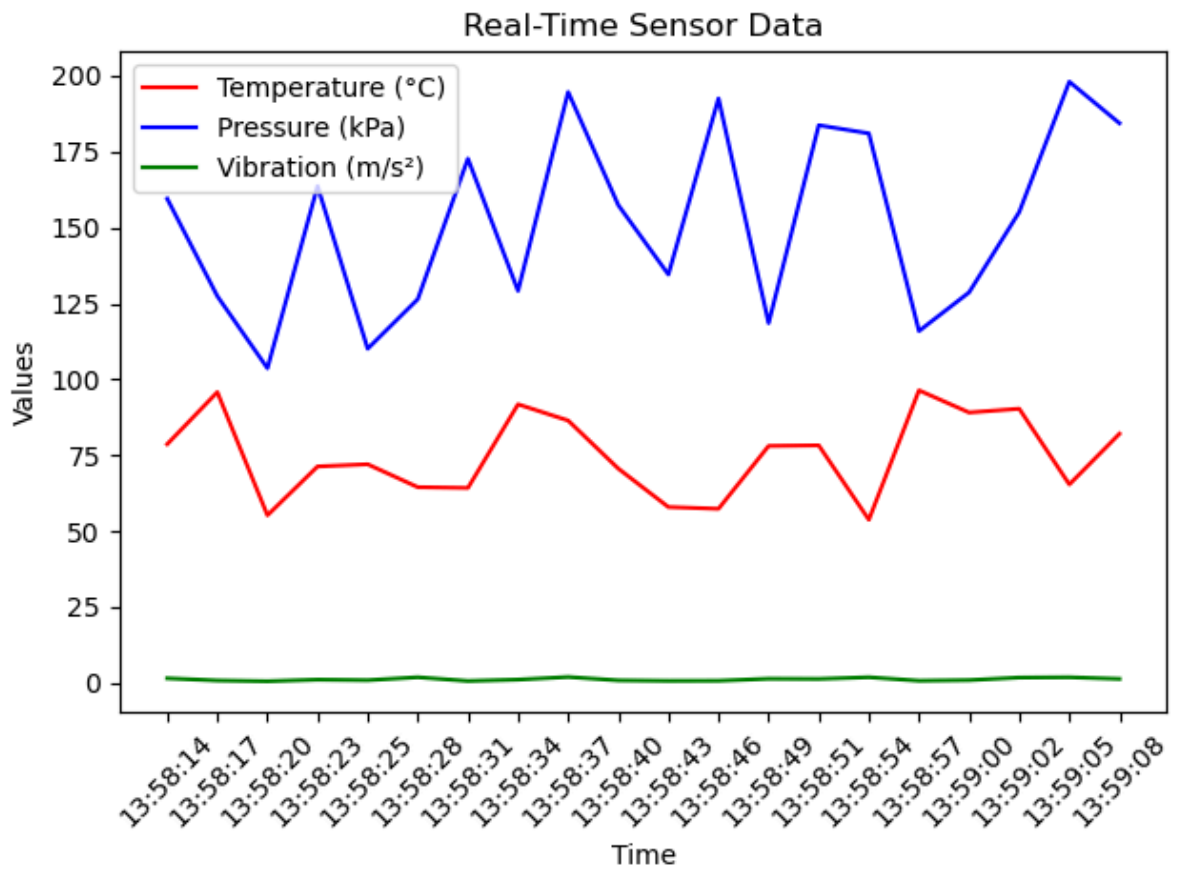
Anomalies at 13:59:02: High Temperature, High Pressure, High Vibration



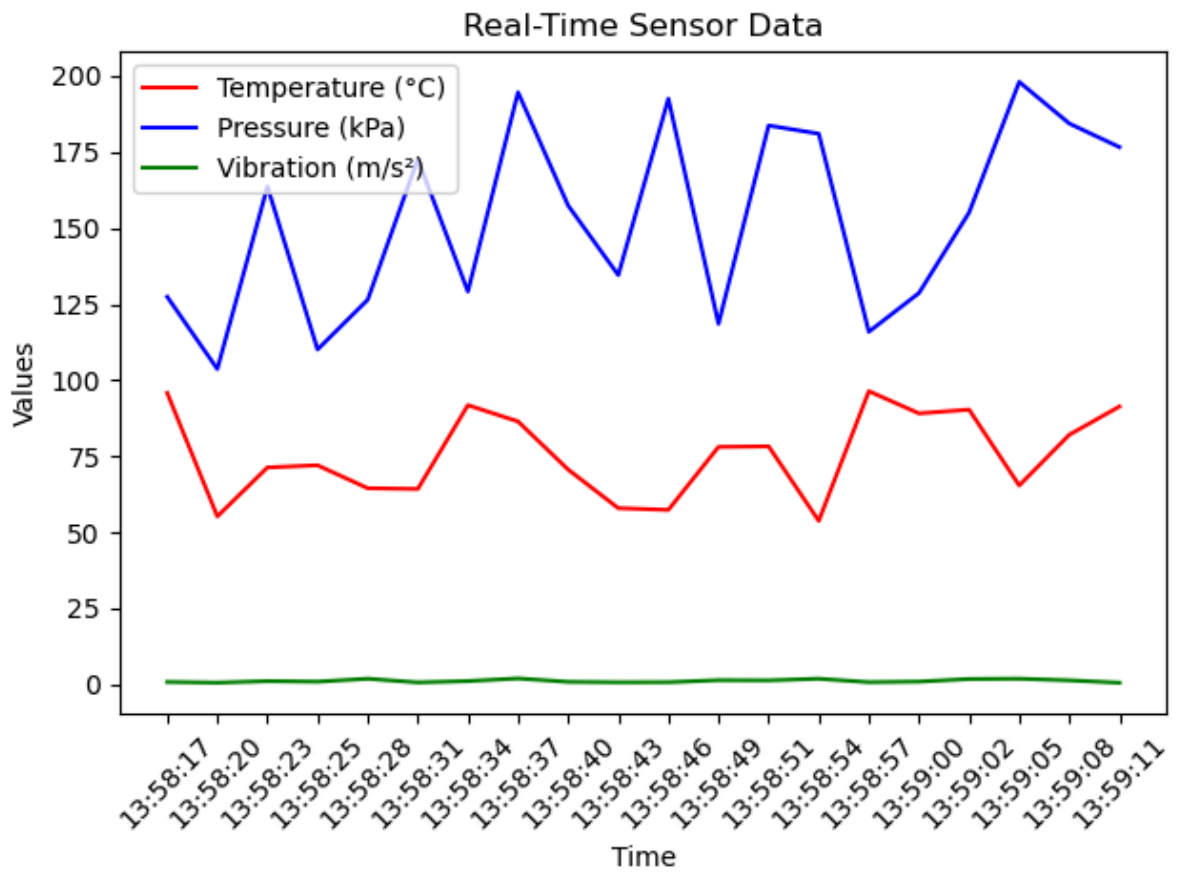
Anomalies at 13:59:05: High Pressure, High Vibration



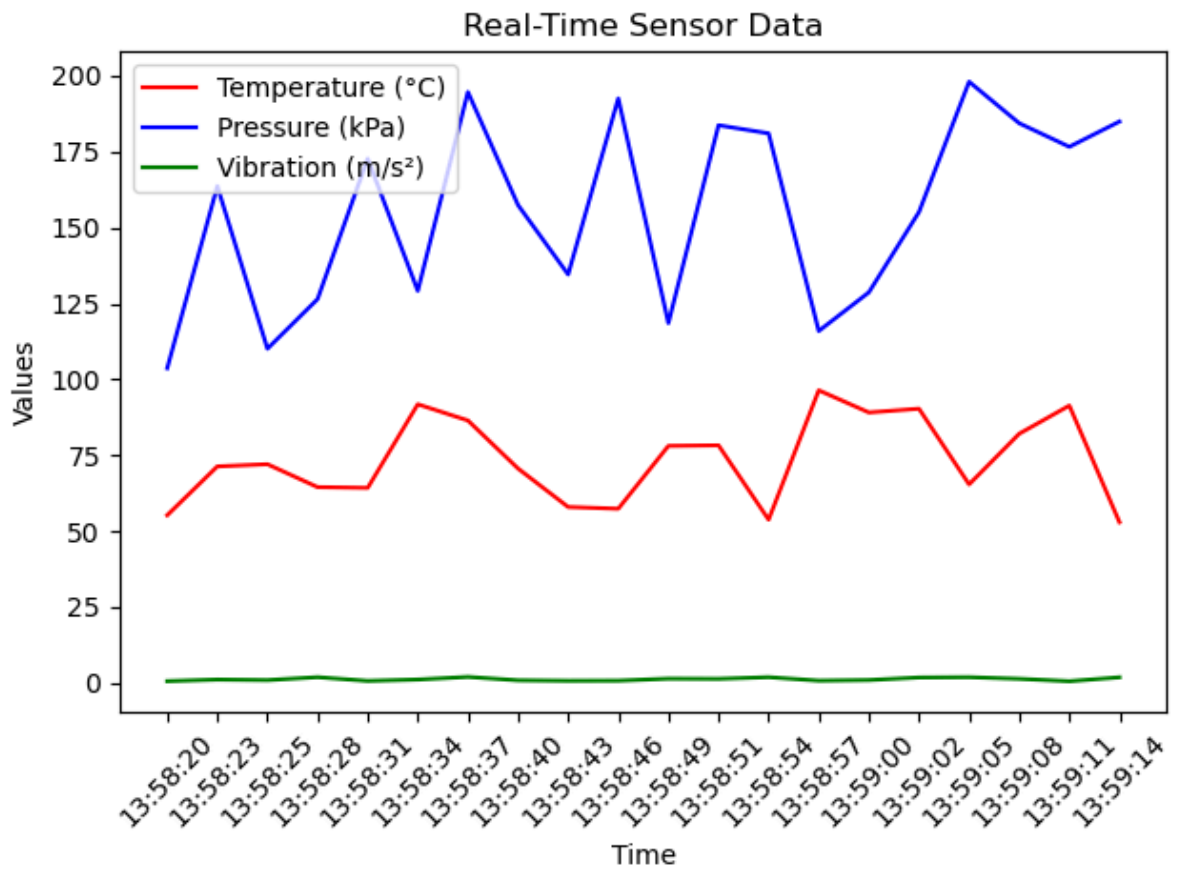
Anomalies at 13:59:08: High Temperature, High Pressure



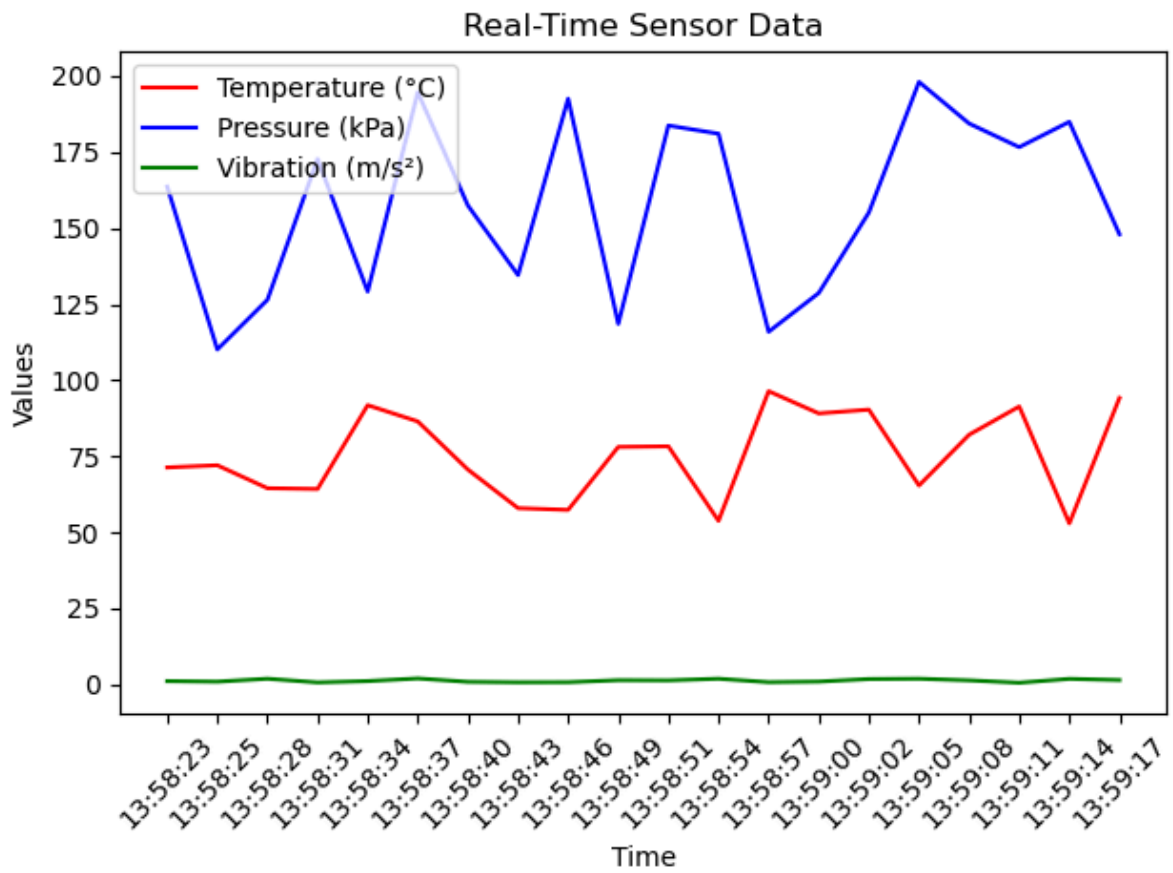
Anomalies at 13:59:11: High Temperature, High Pressure



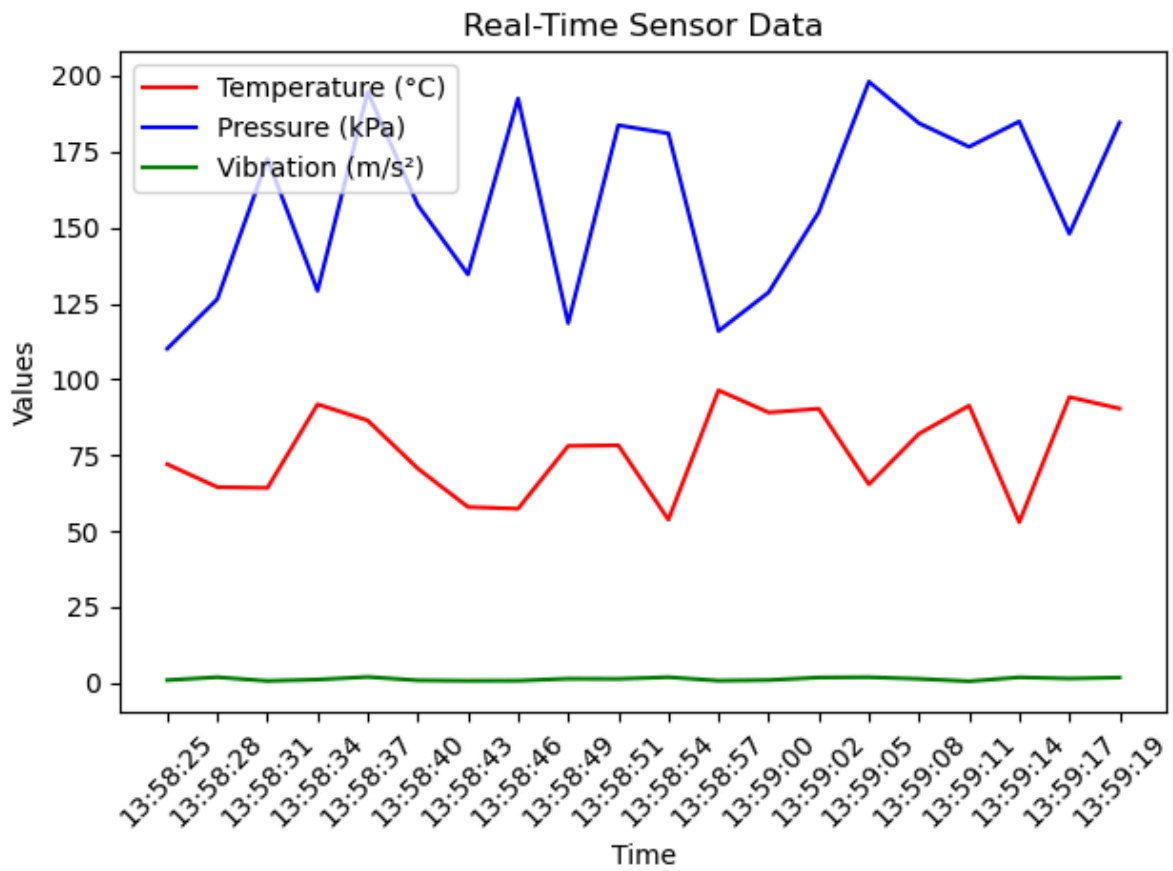
Anomalies at 13:59:14: High Pressure, High Vibration



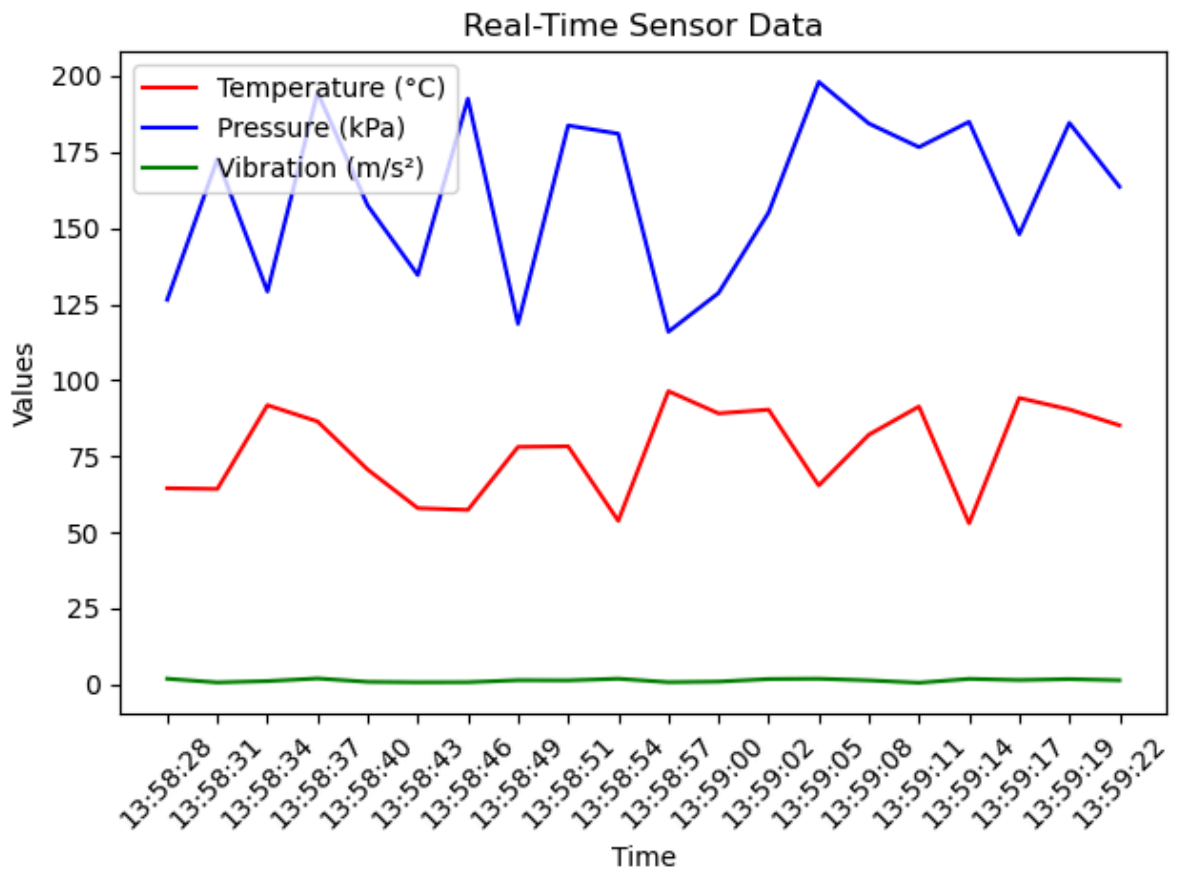
Anomalies at 13:59:17: High Temperature



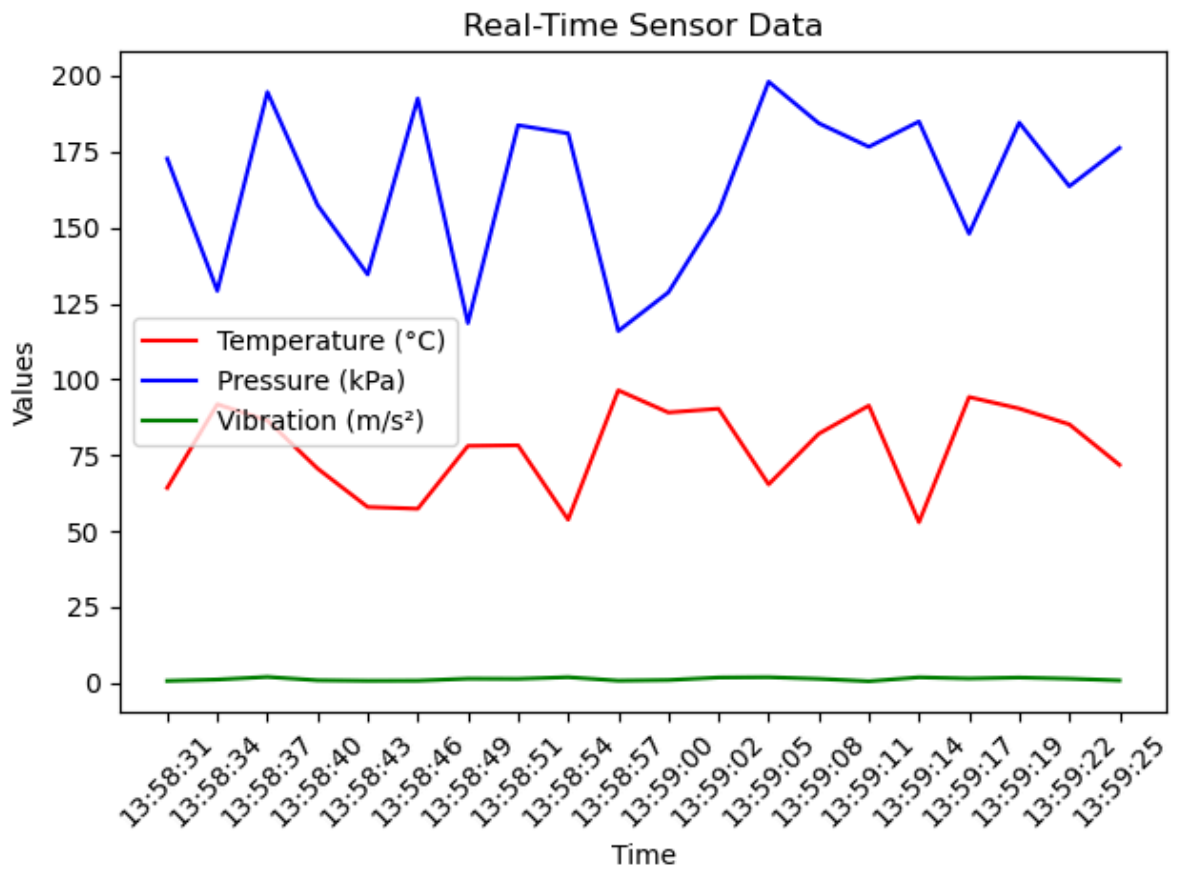
Anomalies at 13:59:19: High Temperature, High Pressure, High Vibration



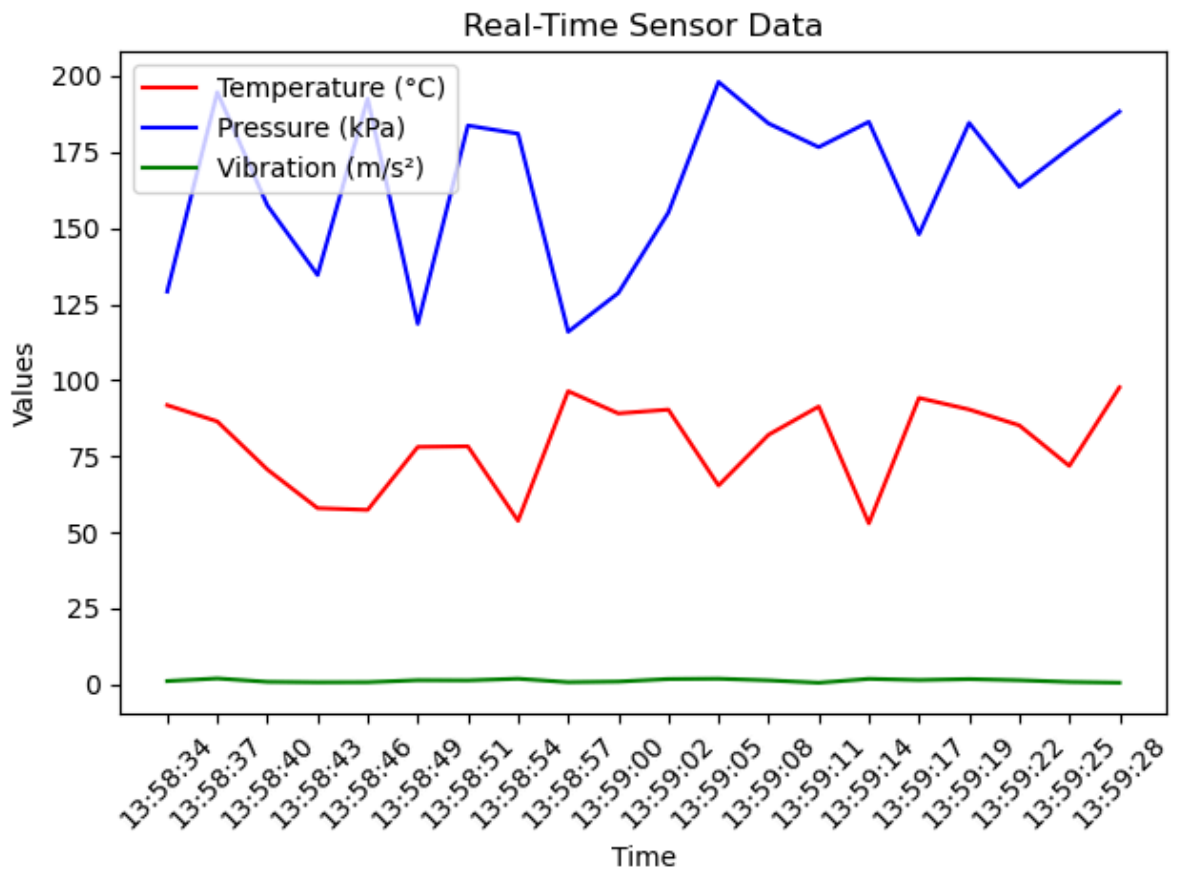
Anomalies at 13:59:22: High Temperature, High Pressure



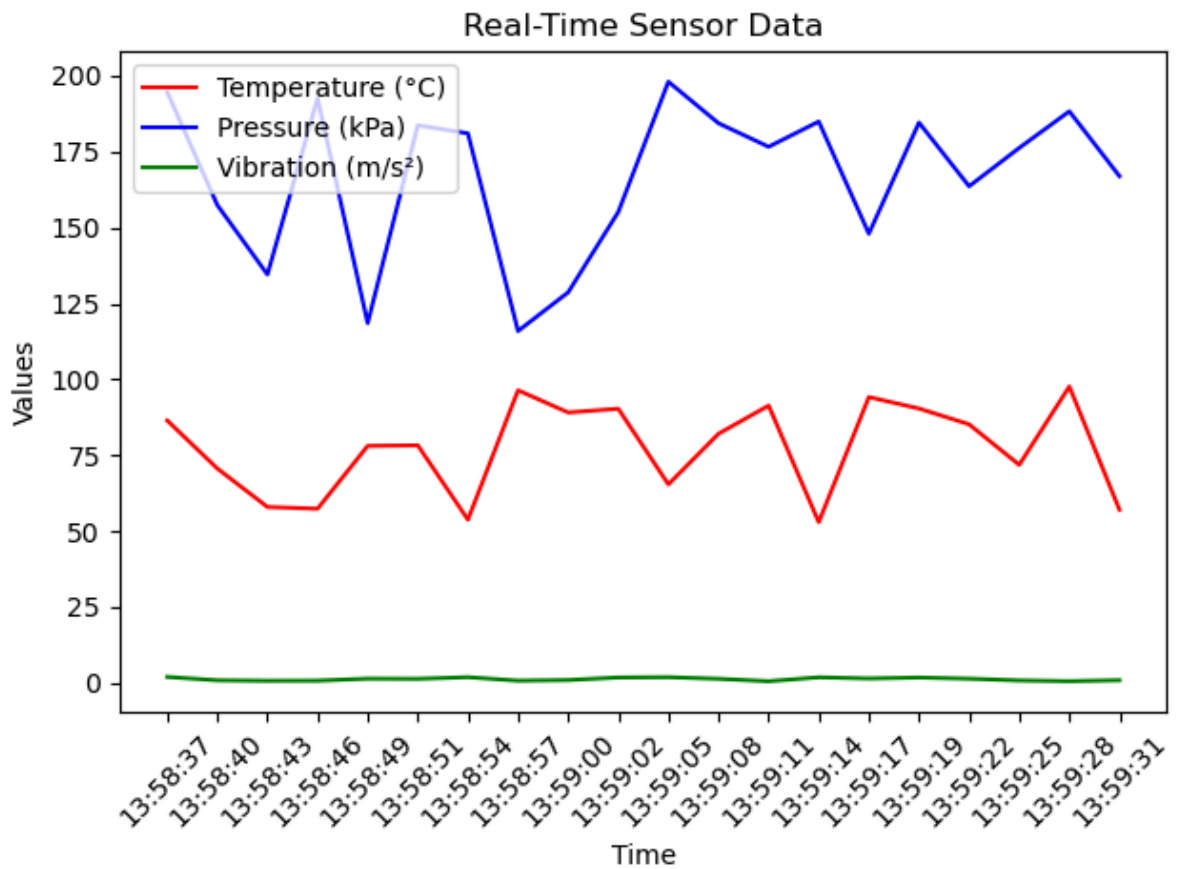
Anomalies at 13:59:25: High Pressure



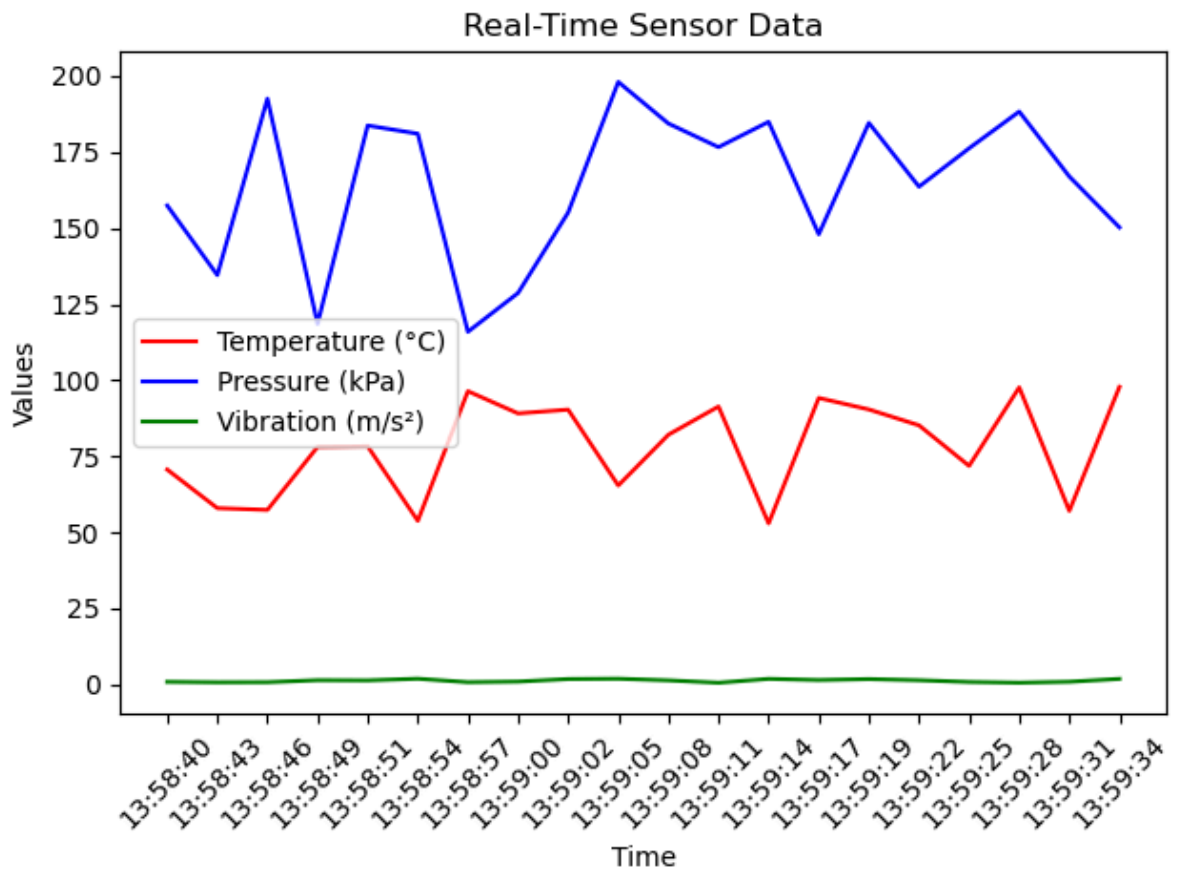
Anomalies at 13:59:28: High Temperature, High Pressure



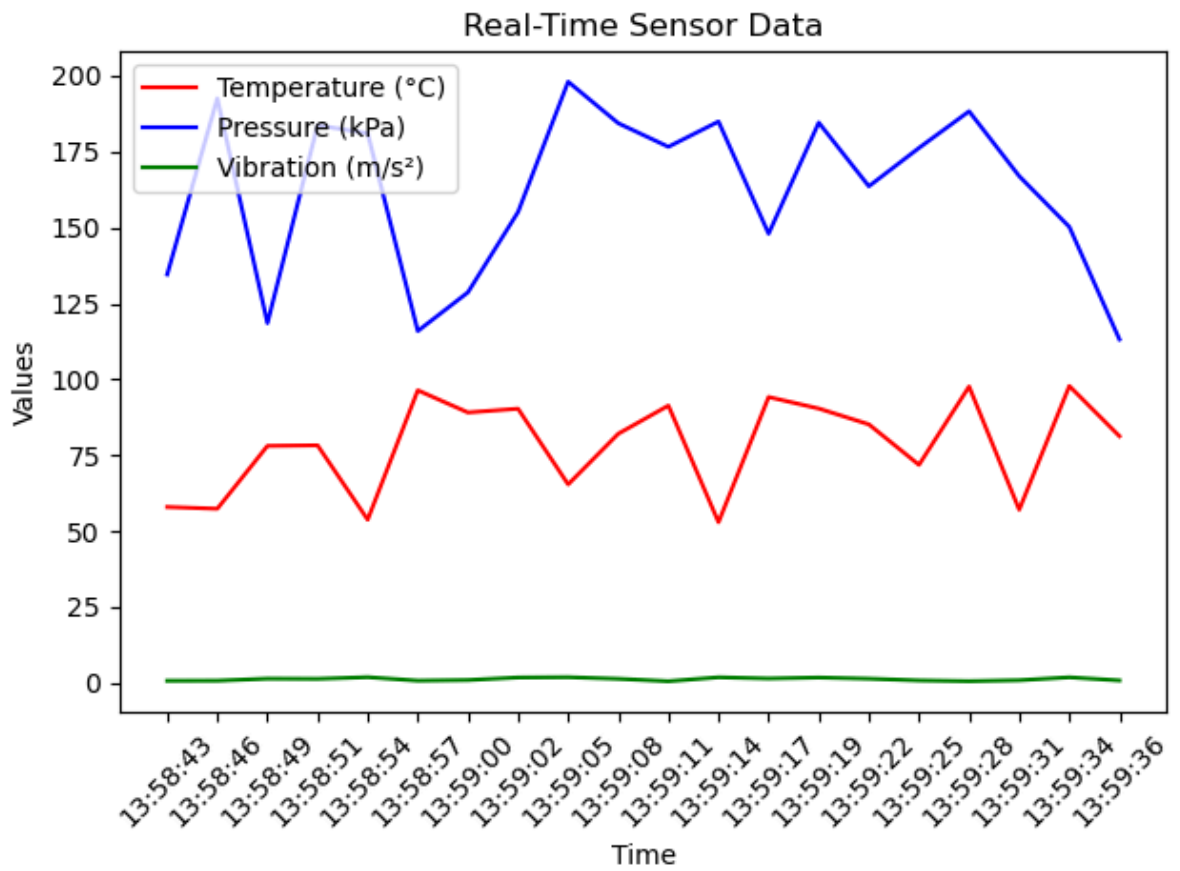
Anomalies at 13:59:31: High Pressure



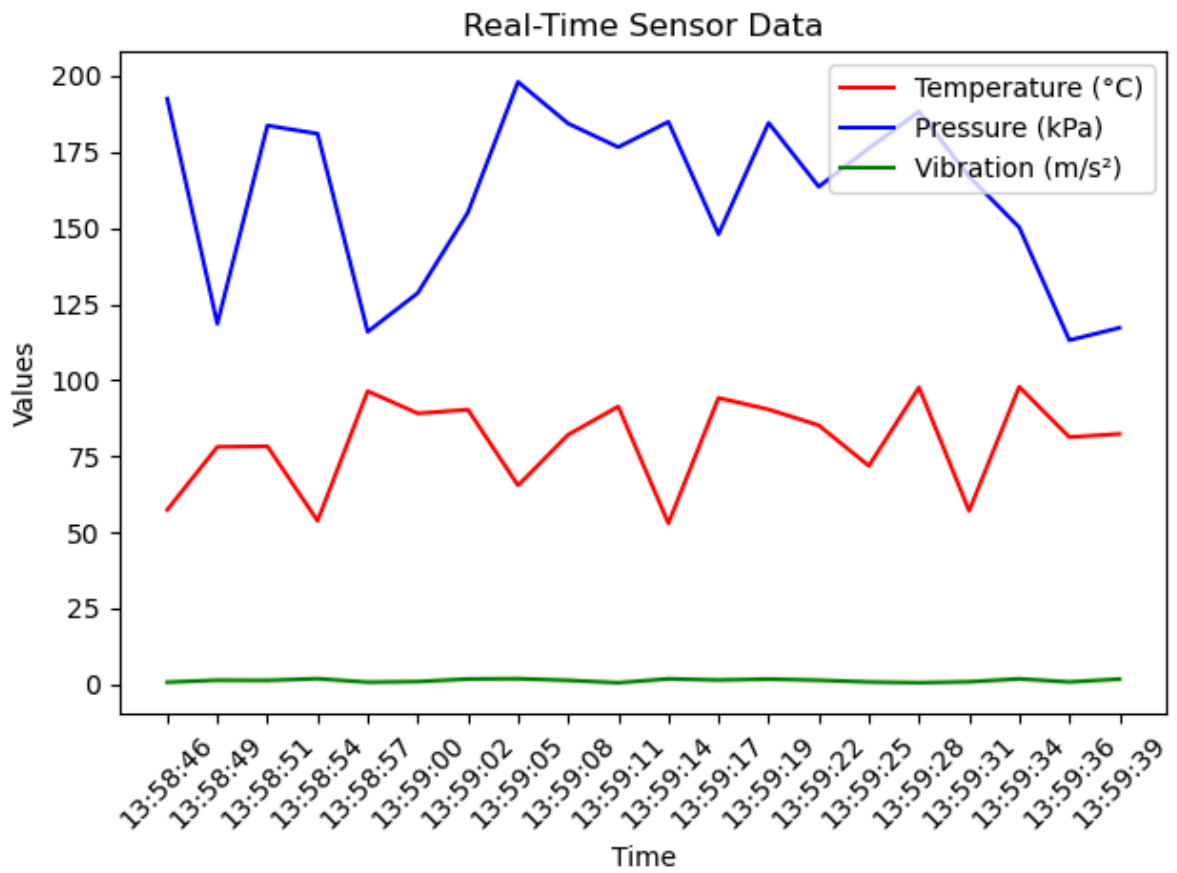
Anomalies at 13:59:34: High Temperature, High Pressure, High Vibration



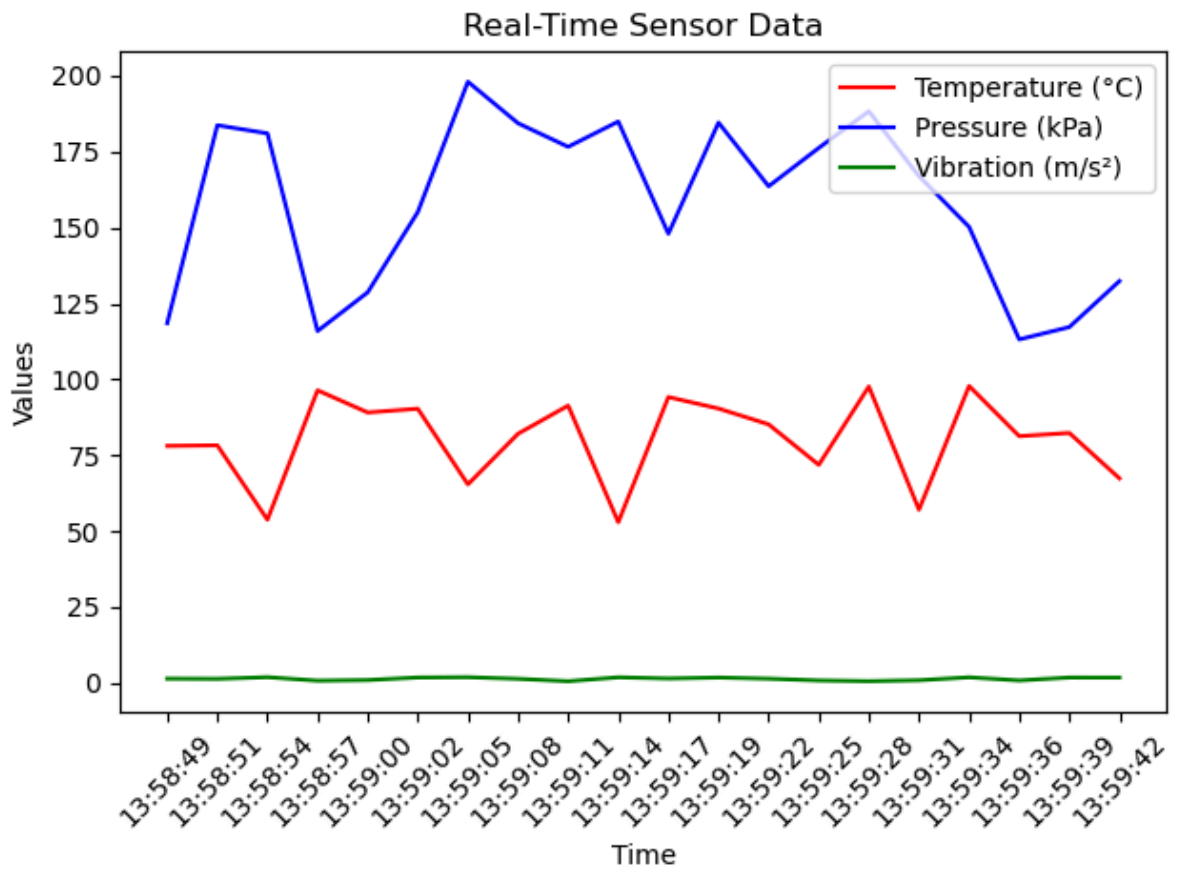
Anomalies at 13:59:36: High Temperature



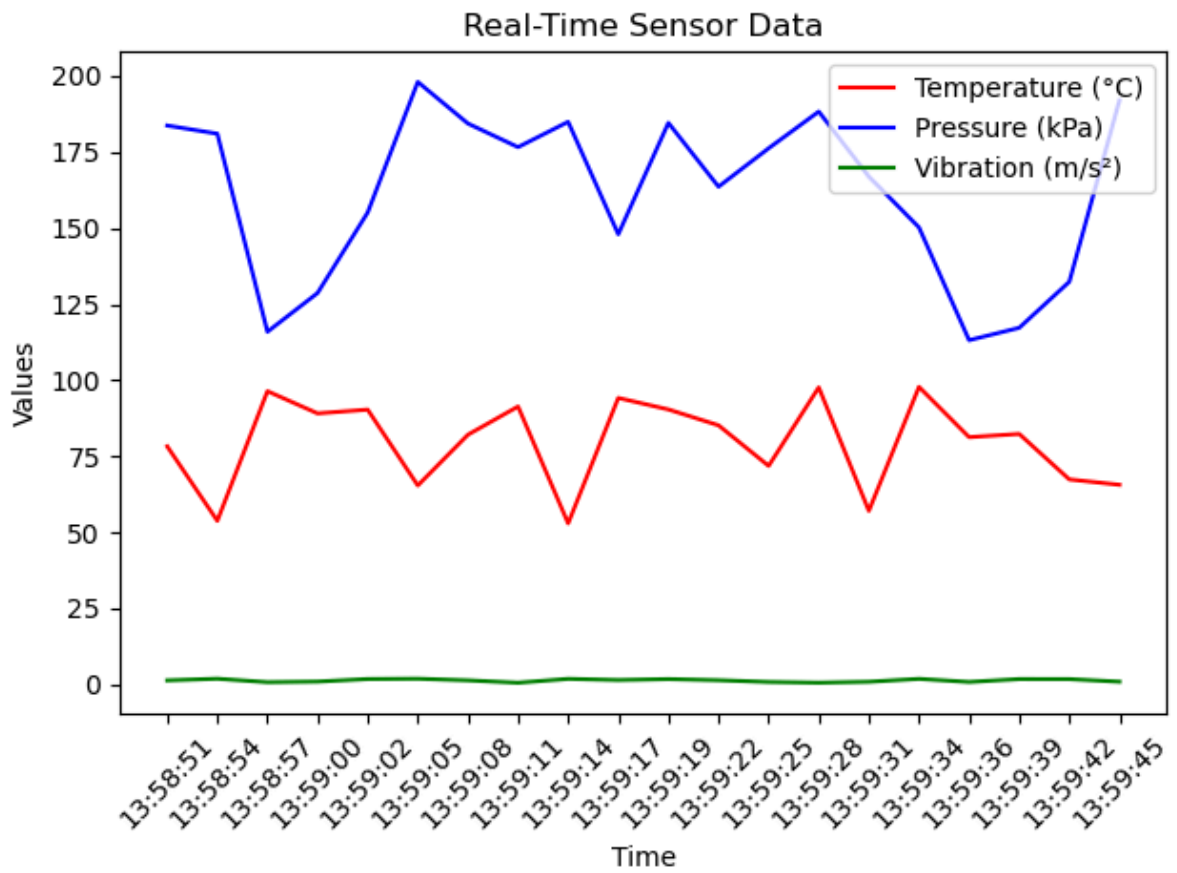
Anomalies at 13:59:39: High Temperature, High Vibration



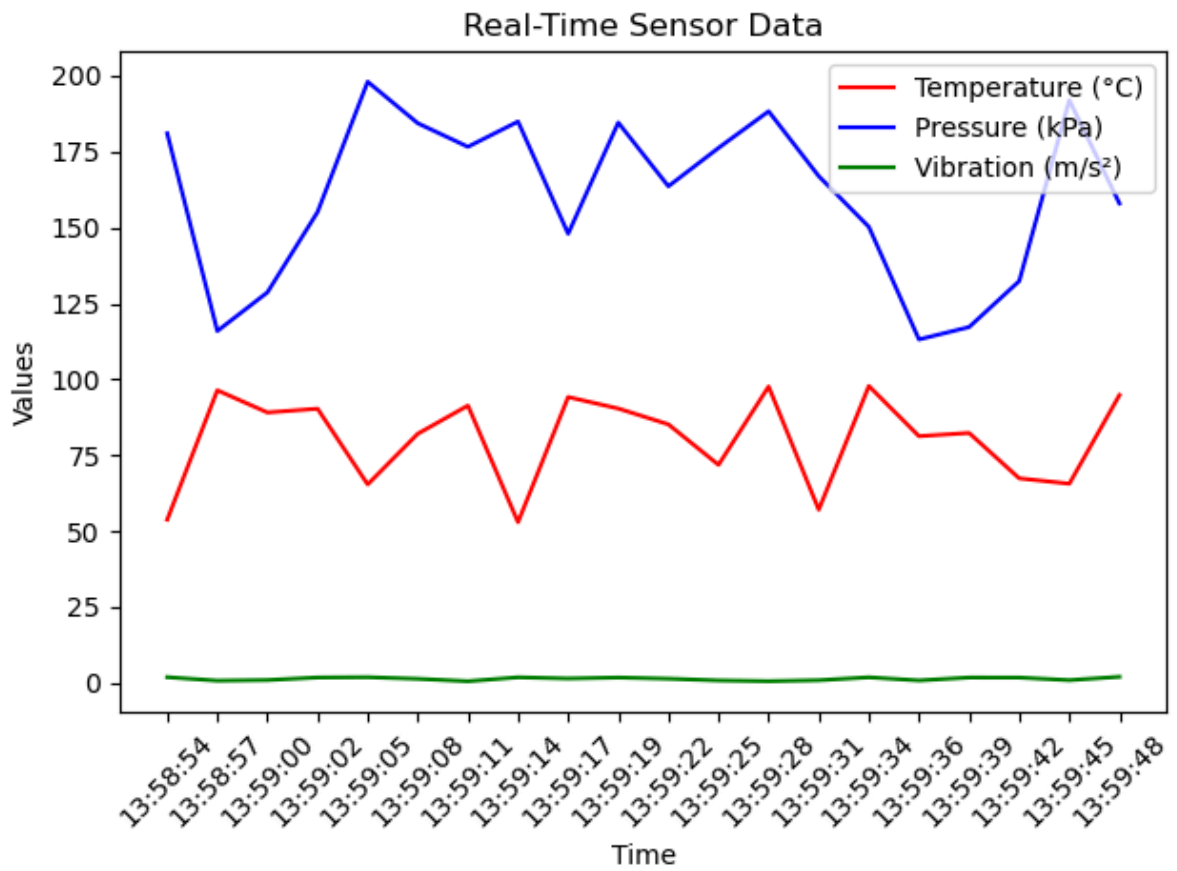
Anomalies at 13:59:42: High Vibration



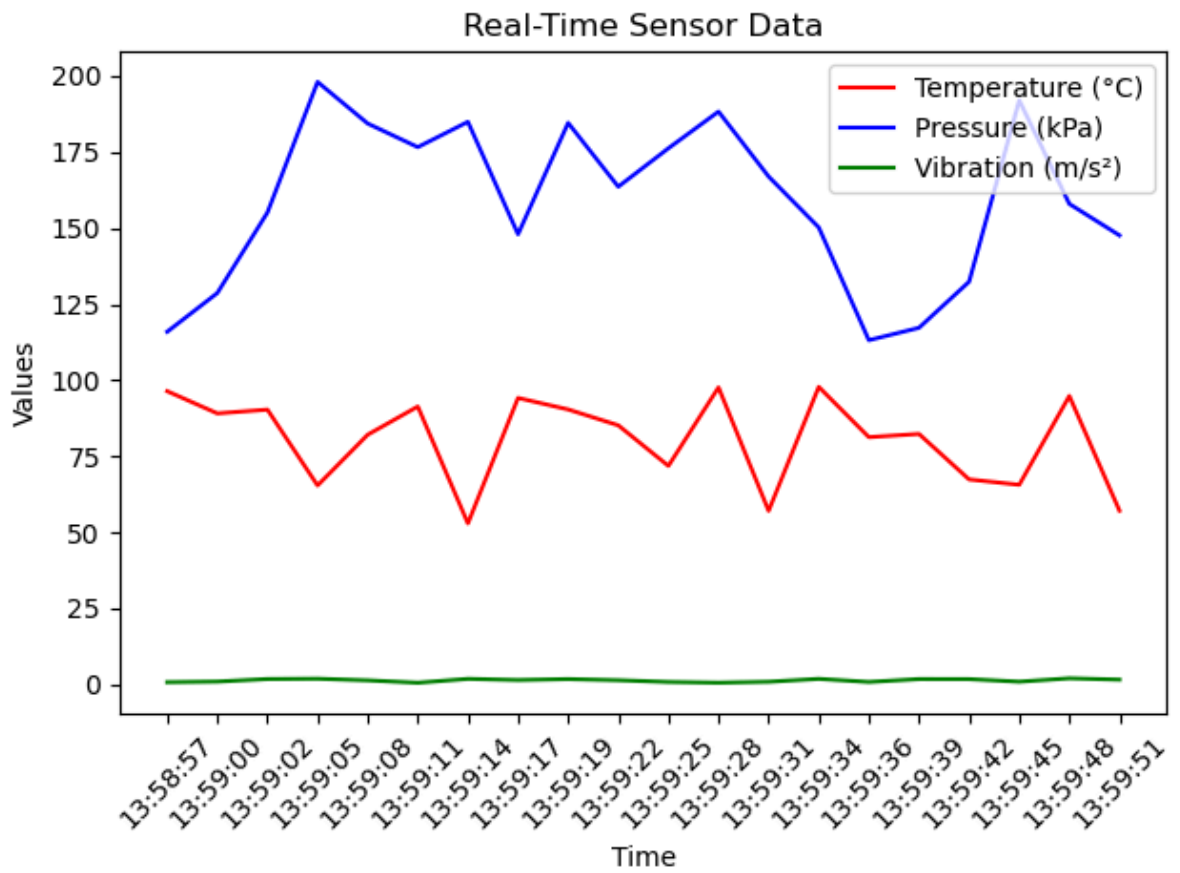
Anomalies at 13:59:45: High Pressure



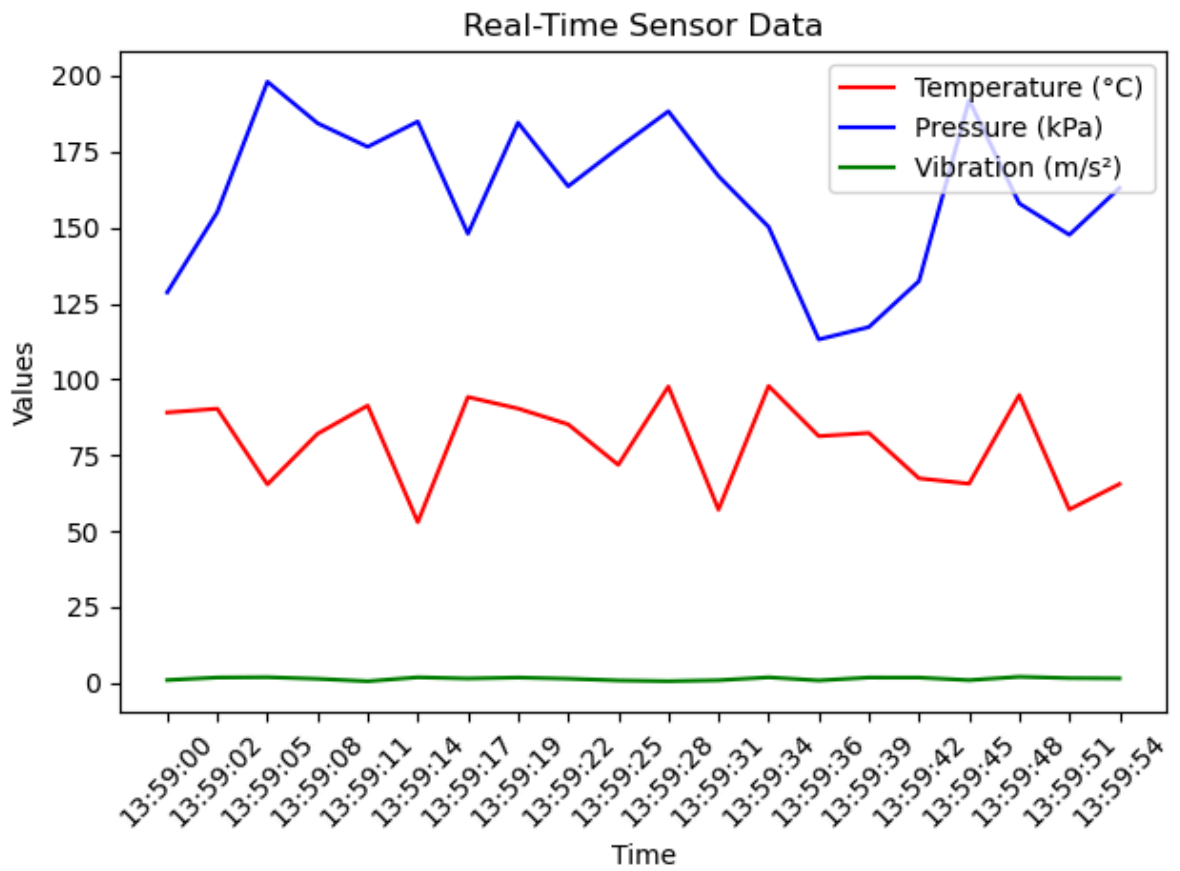
Anomalies at 13:59:48: High Temperature, High Pressure, High Vibration



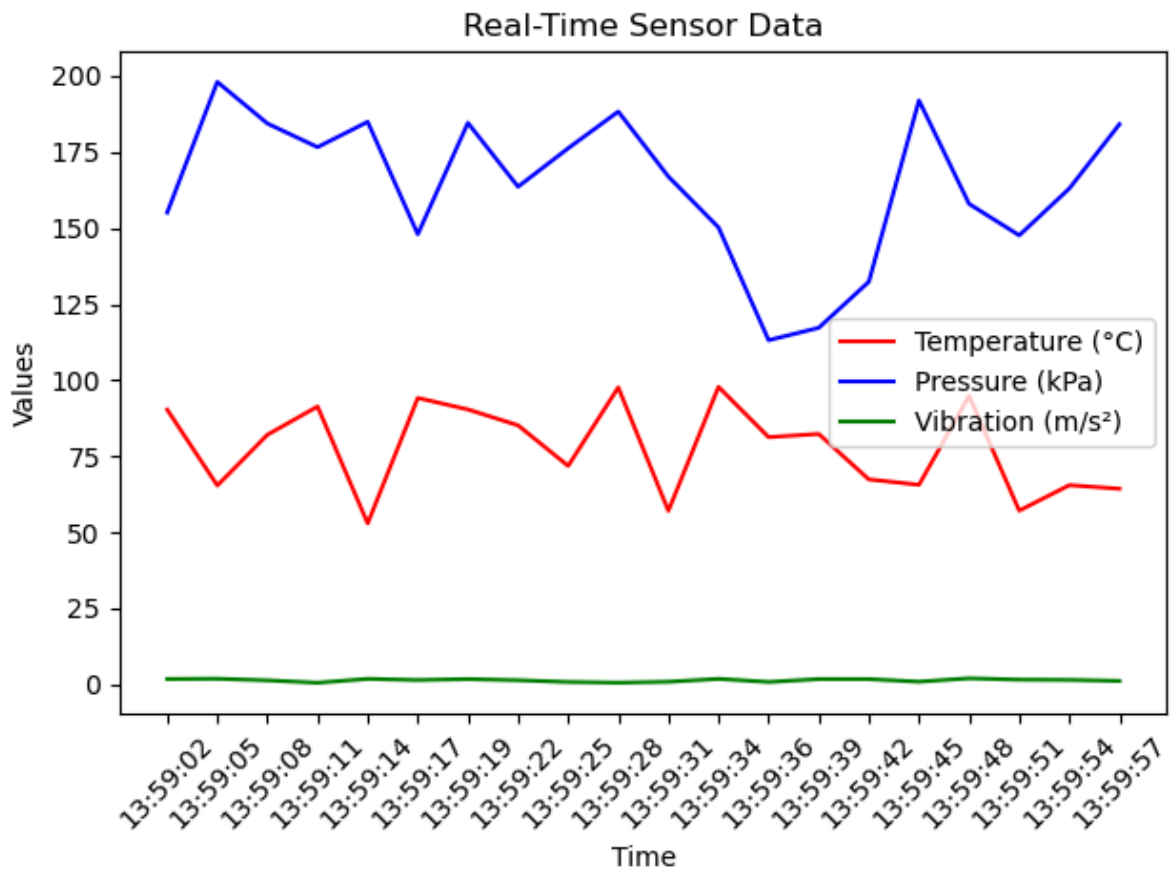
Anomalies at 13:59:51: High Vibration



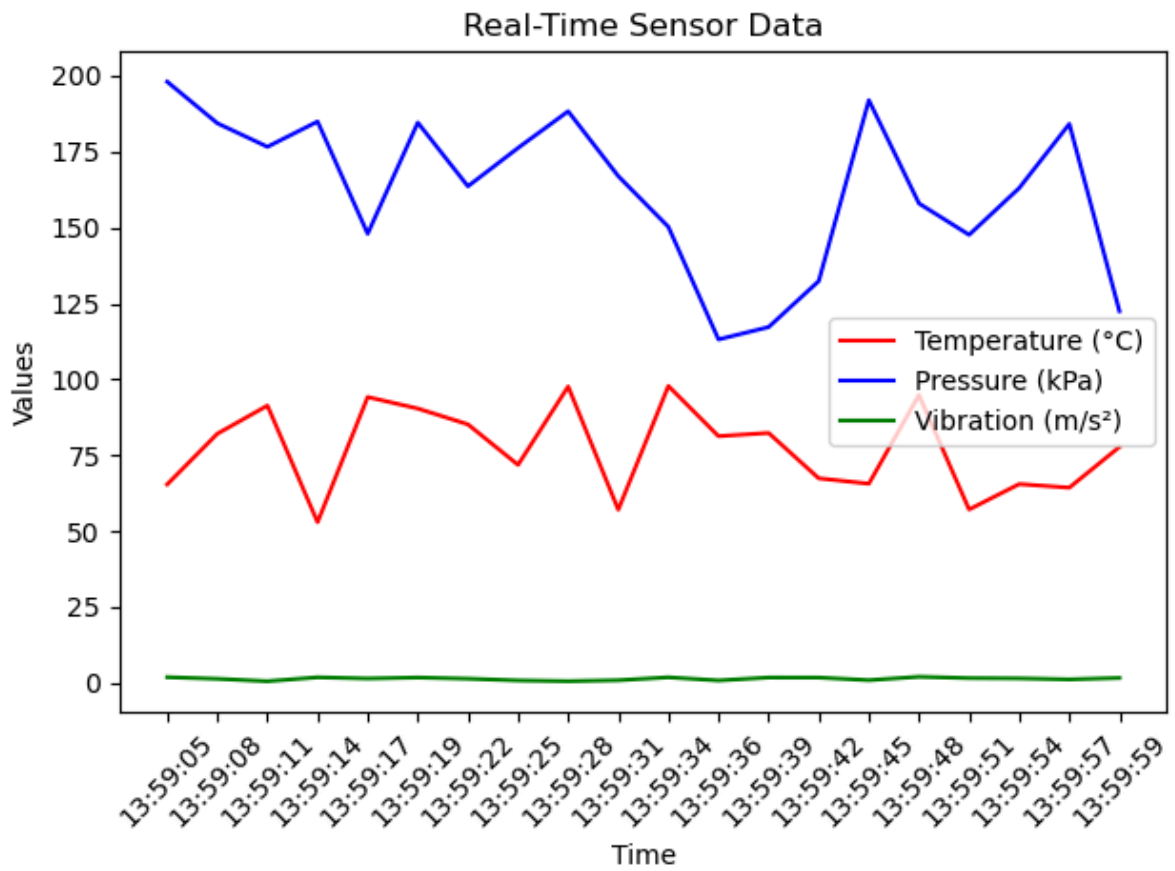
Anomalies at 13:59:54: High Pressure

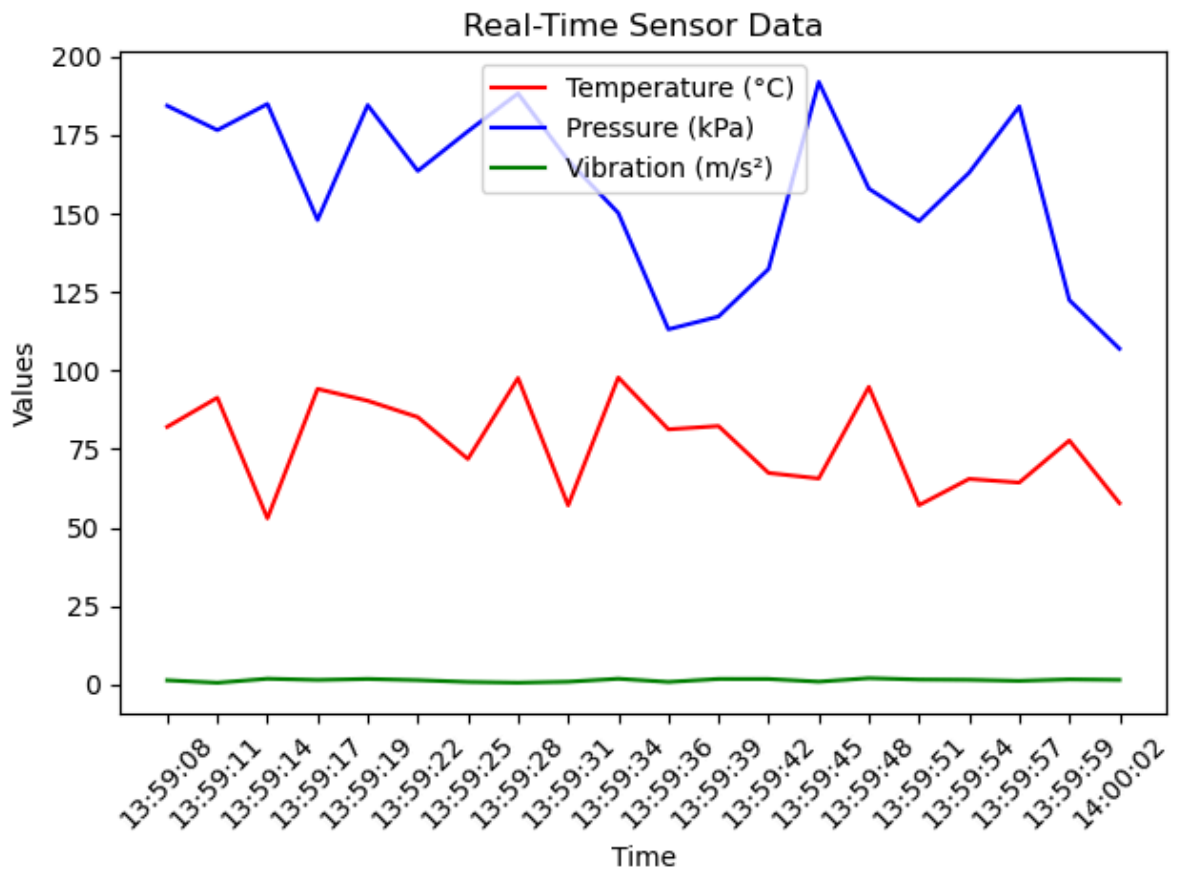


Anomalies at 13:59:57: High Pressure

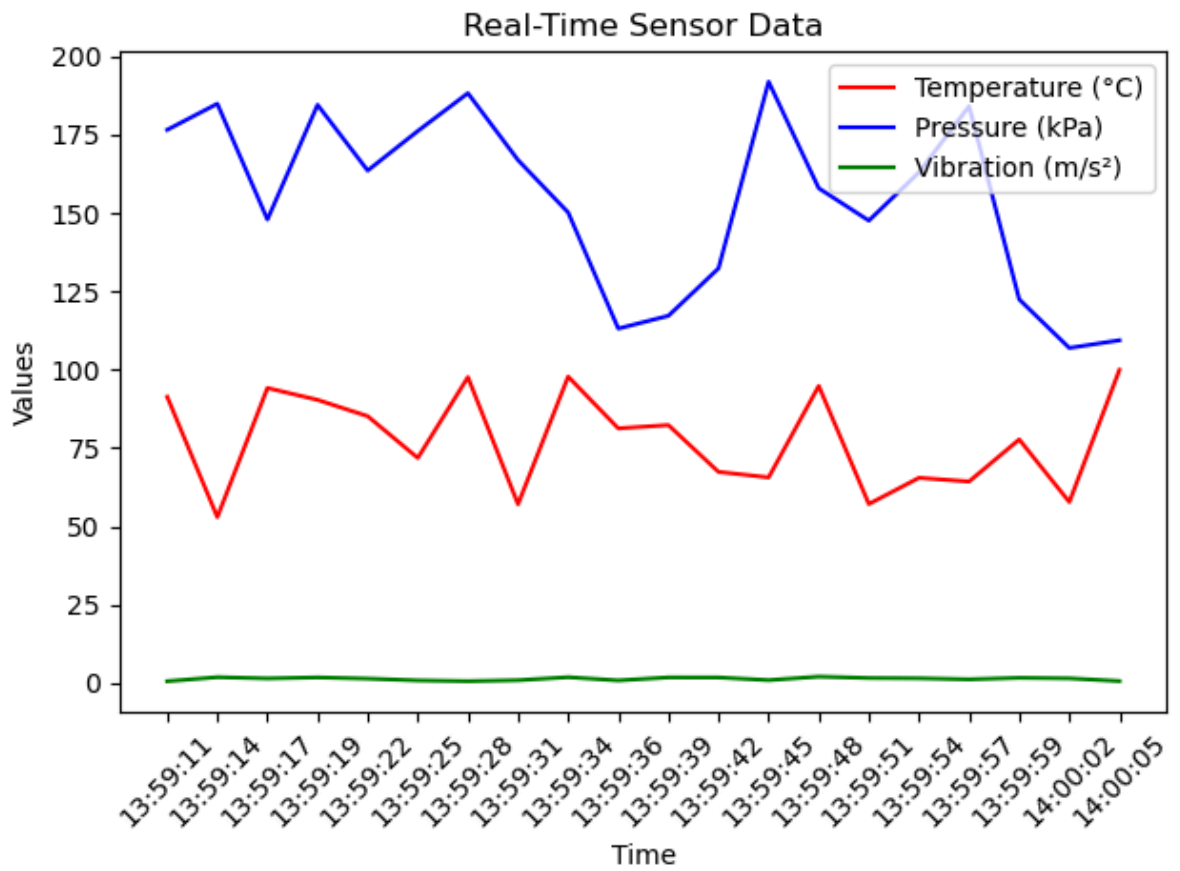


Anomalies at 13:59:59: High Vibration

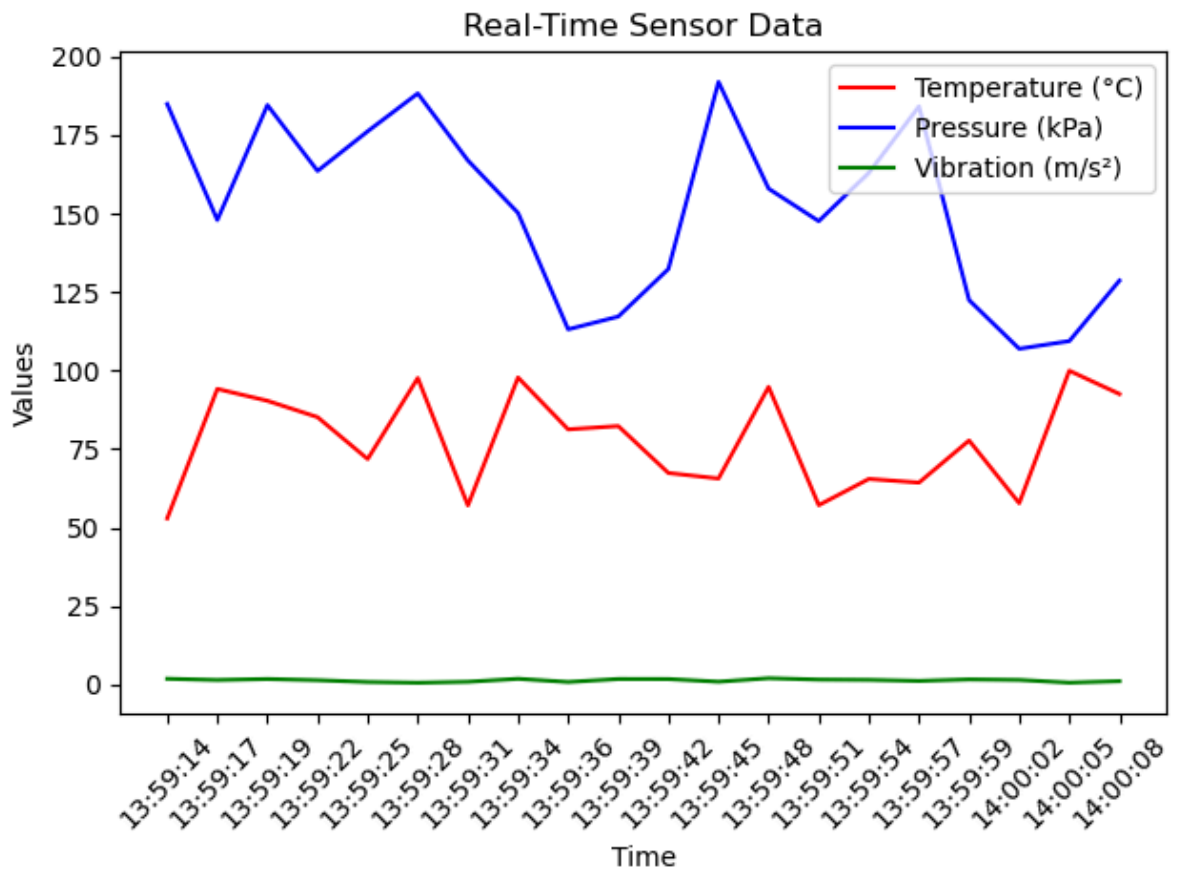




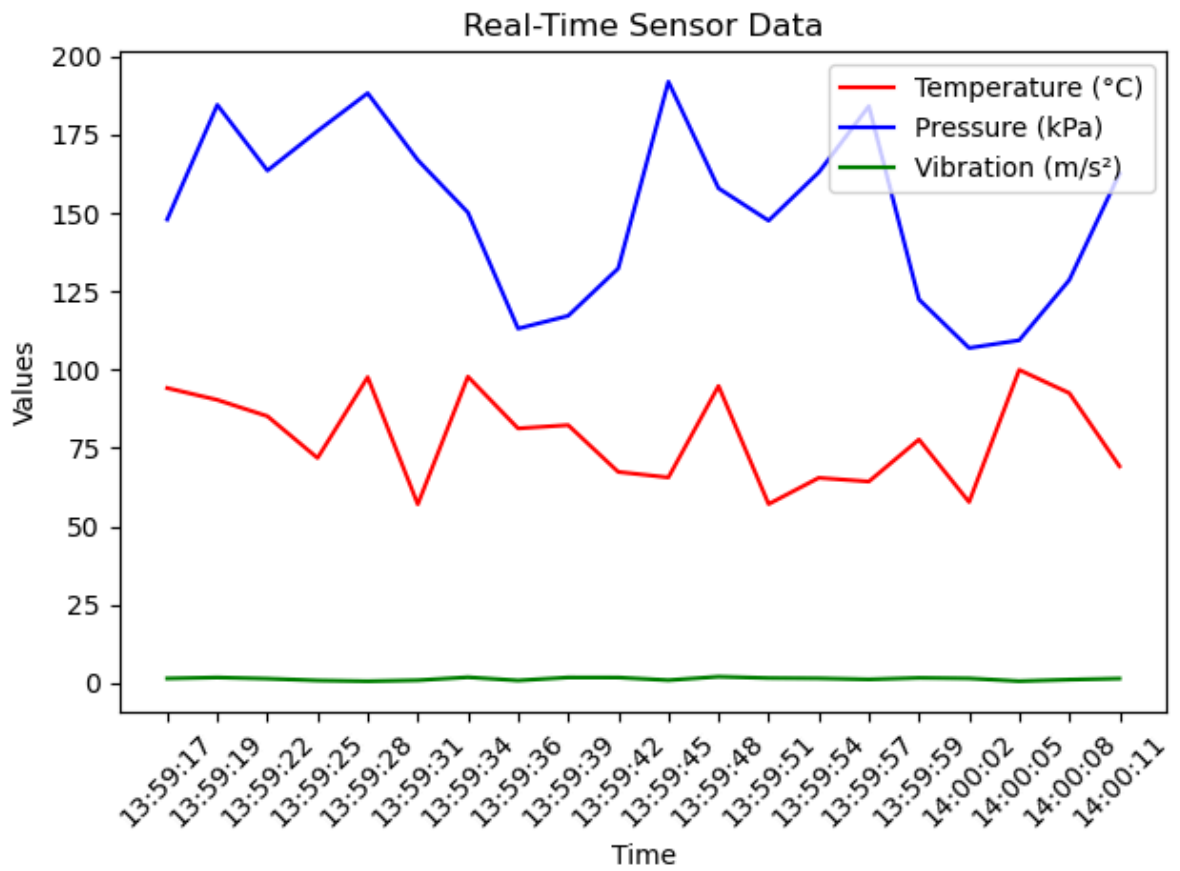
Anomalies at 14:00:05: High Temperature



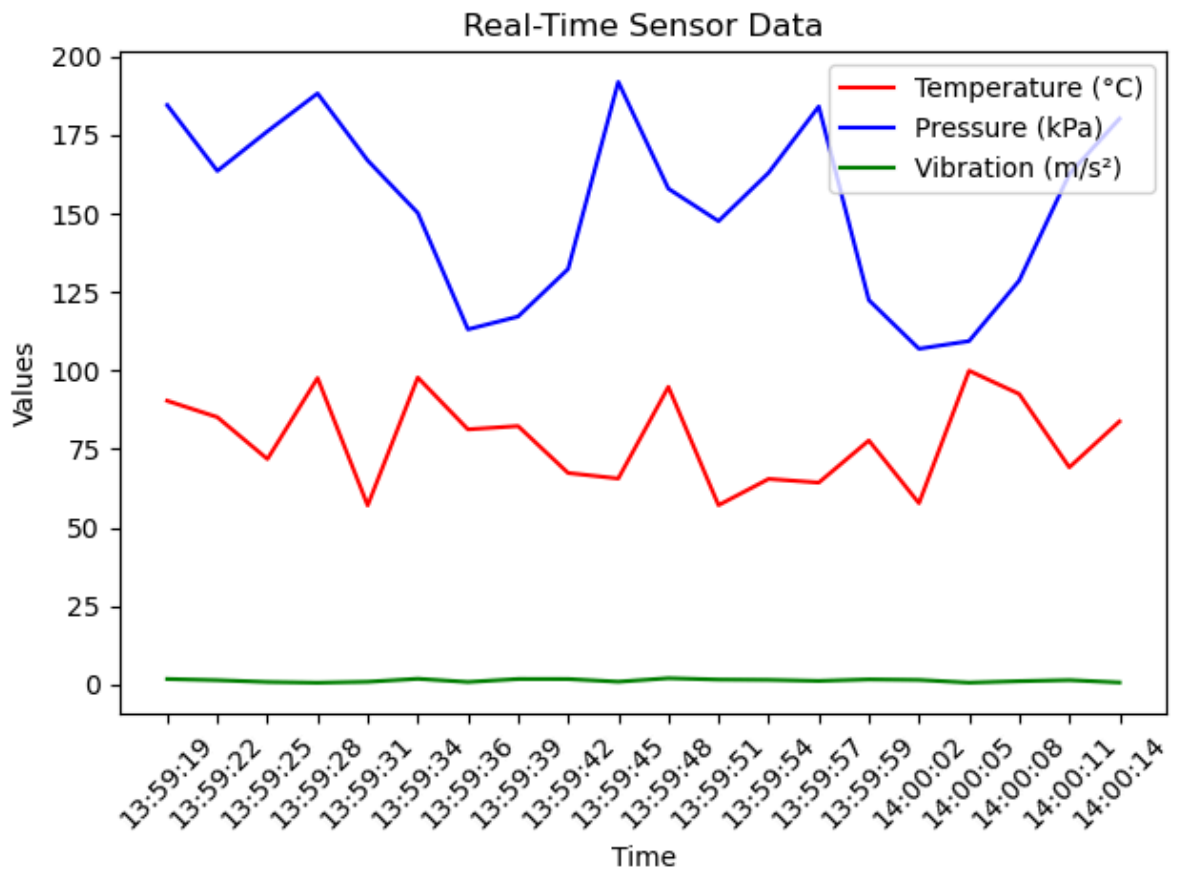
Anomalies at 14:00:08: High Temperature



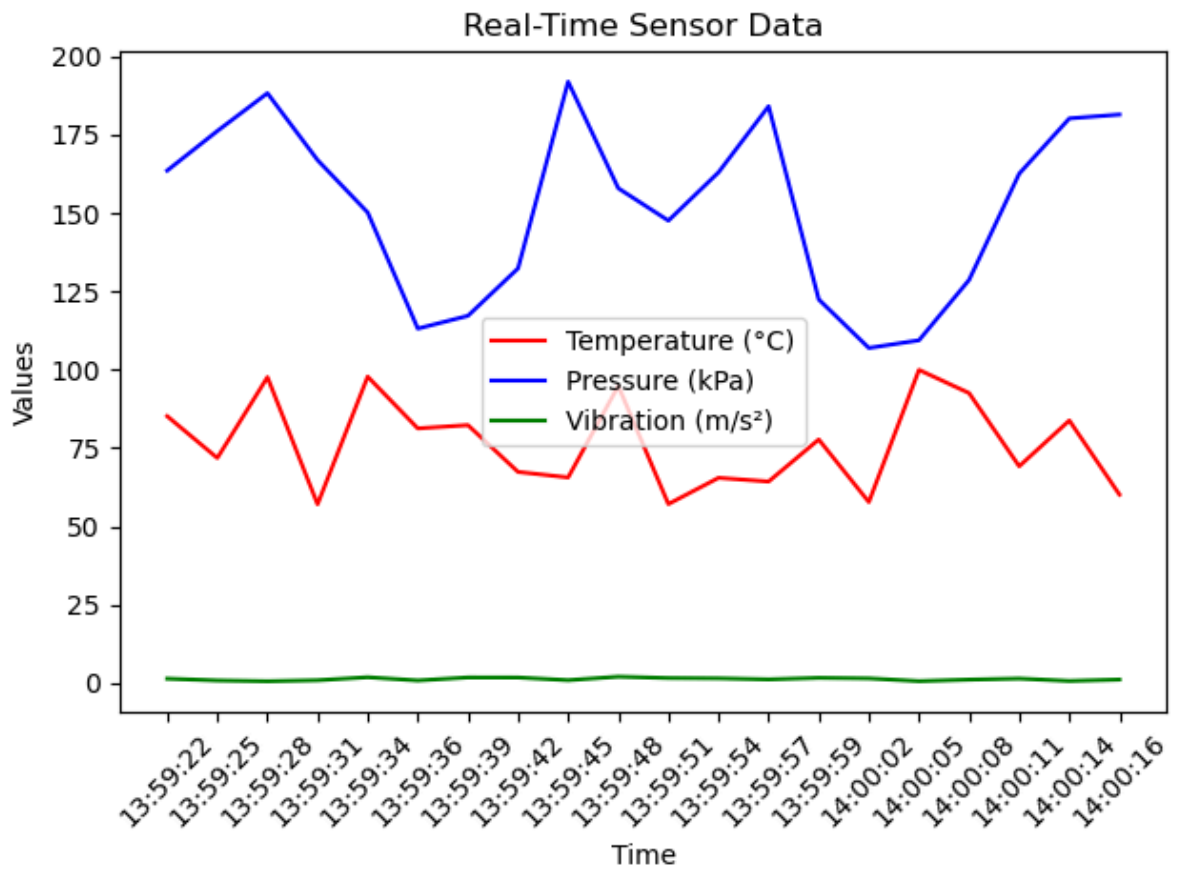
Anomalies at 14:00:11: High Pressure



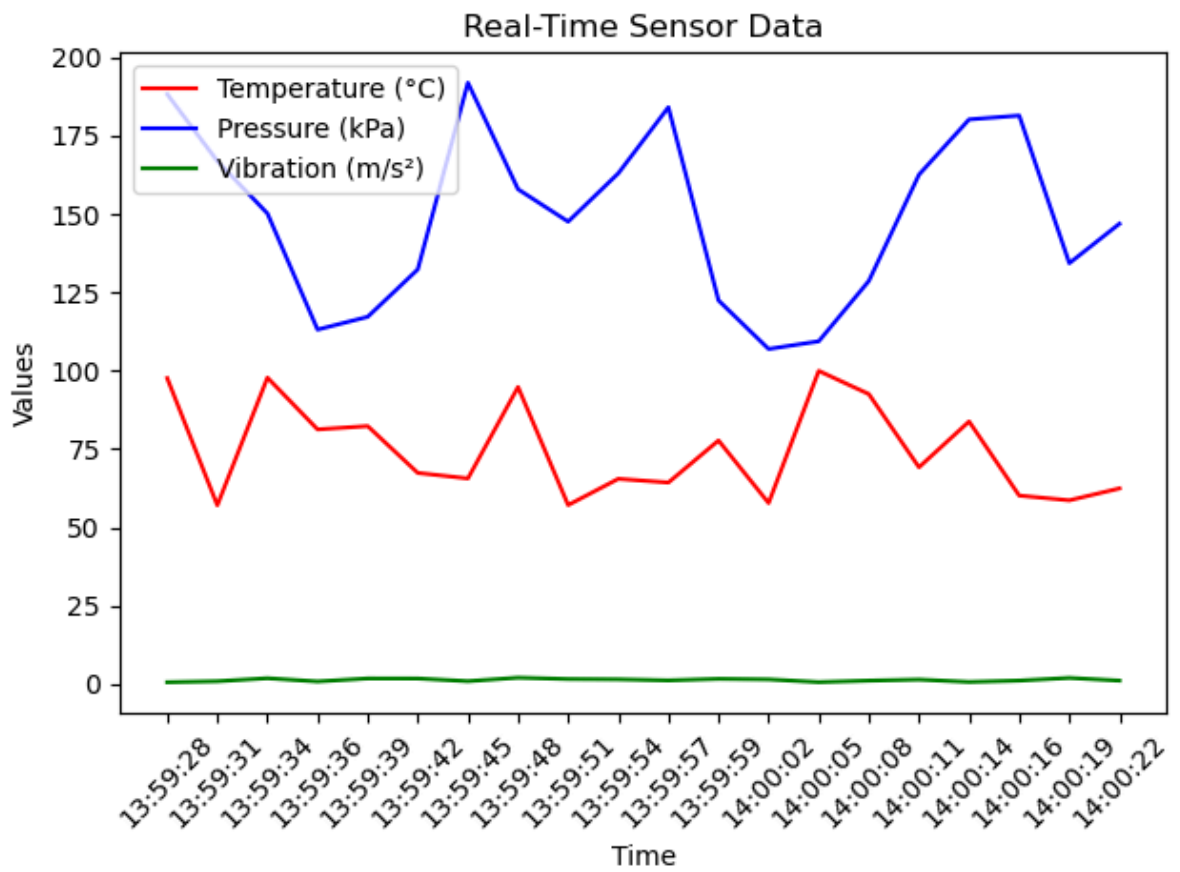
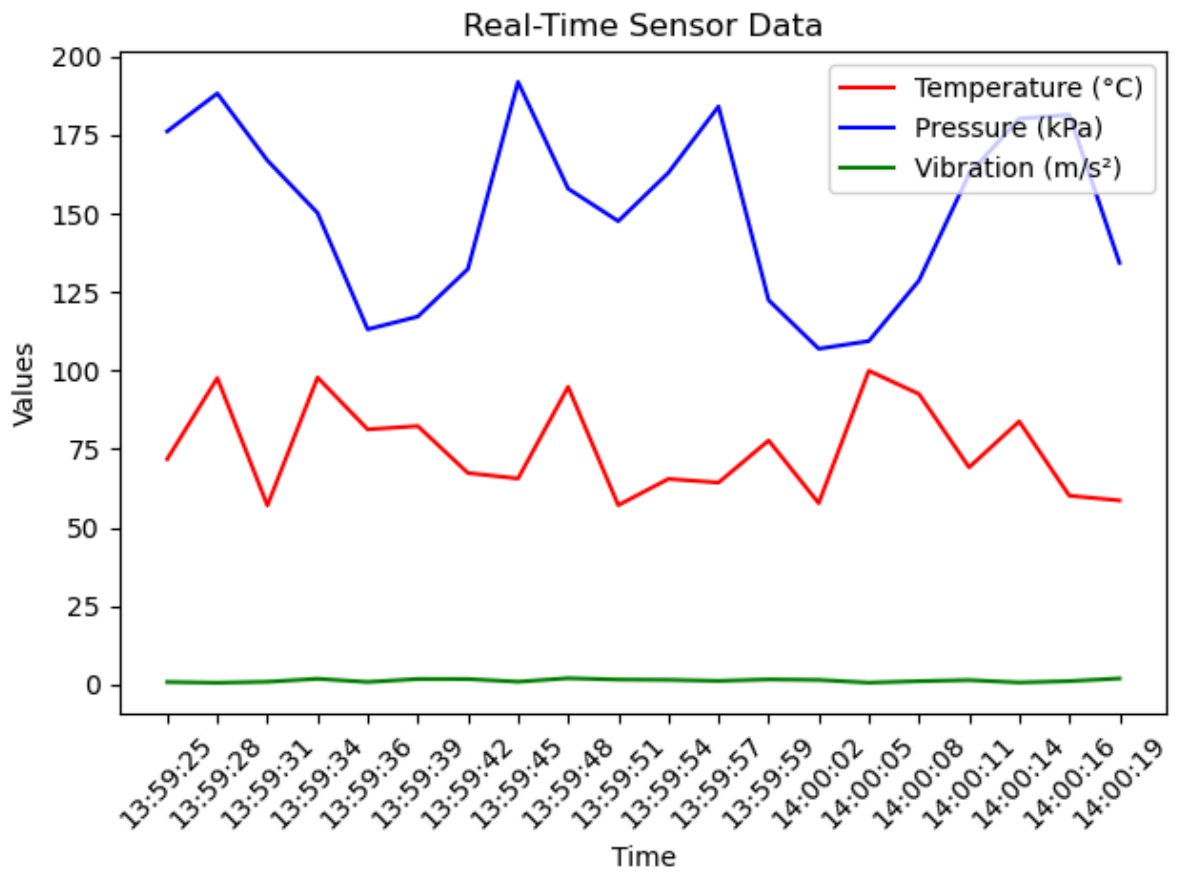
Anomalies at 14:00:14: High Temperature, High Pressure



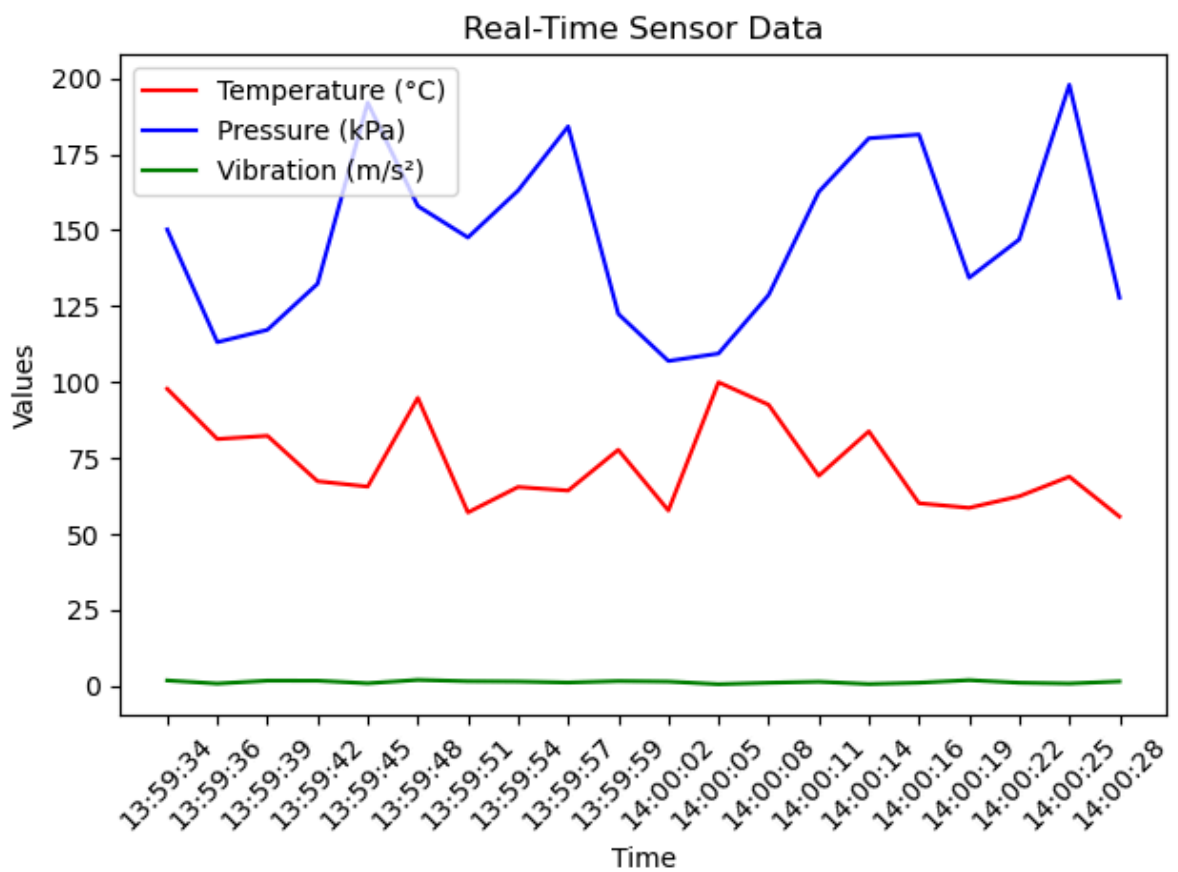
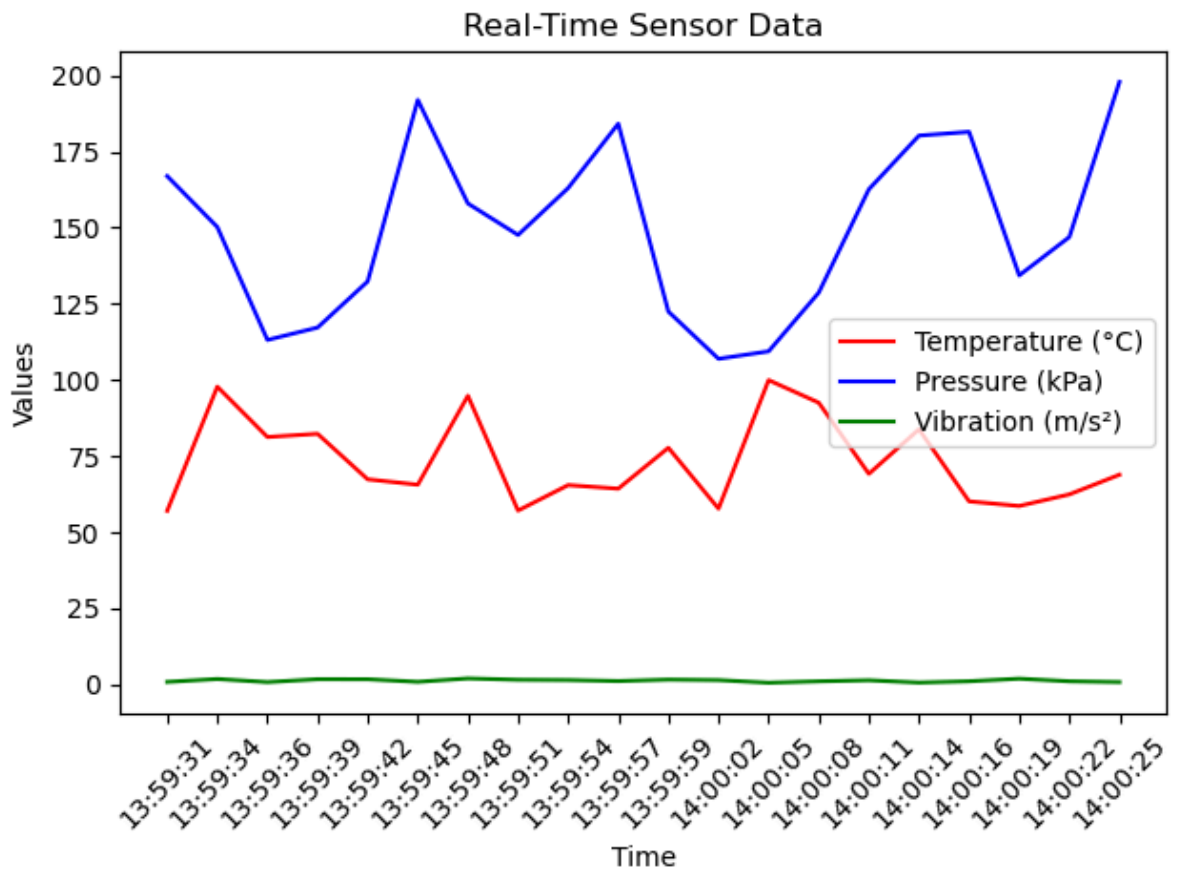
Anomalies at 14:00:16: High Pressure



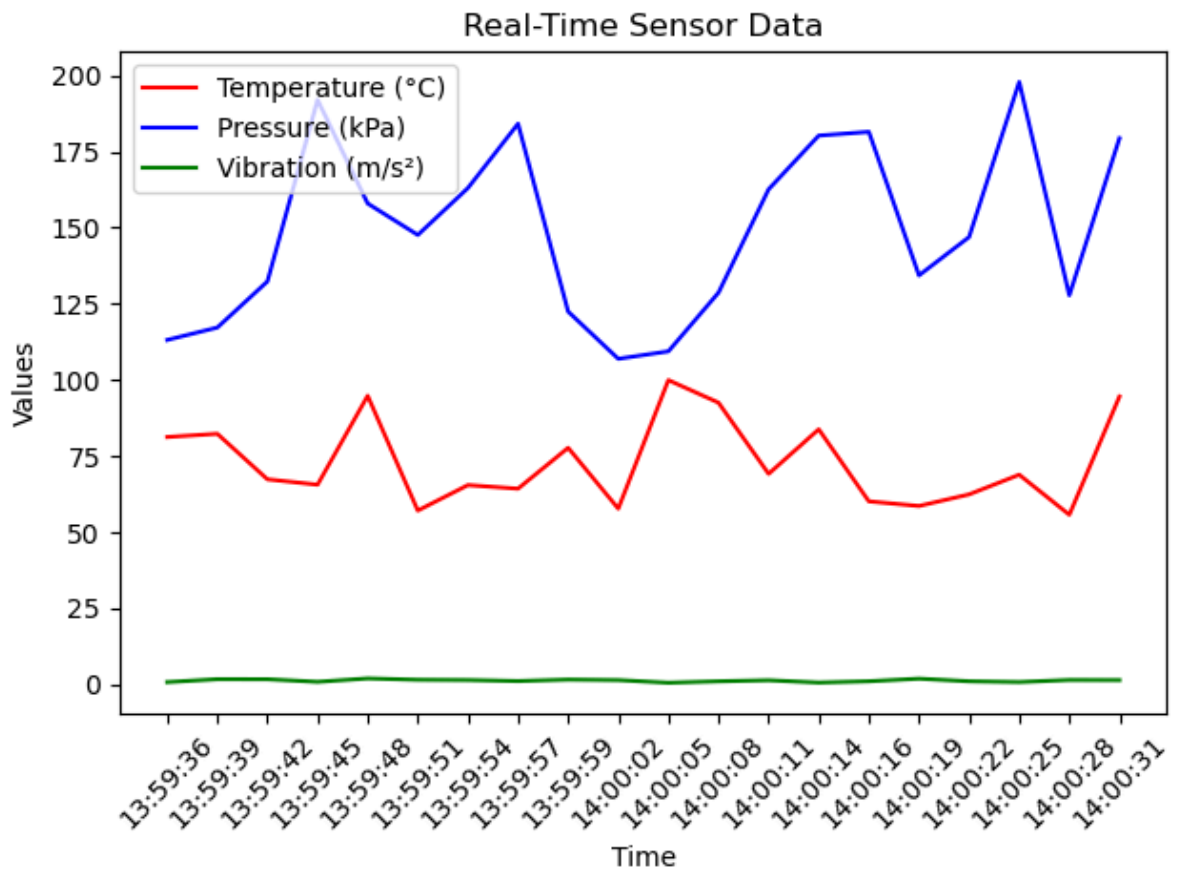
Anomalies at 14:00:19: High Vibration



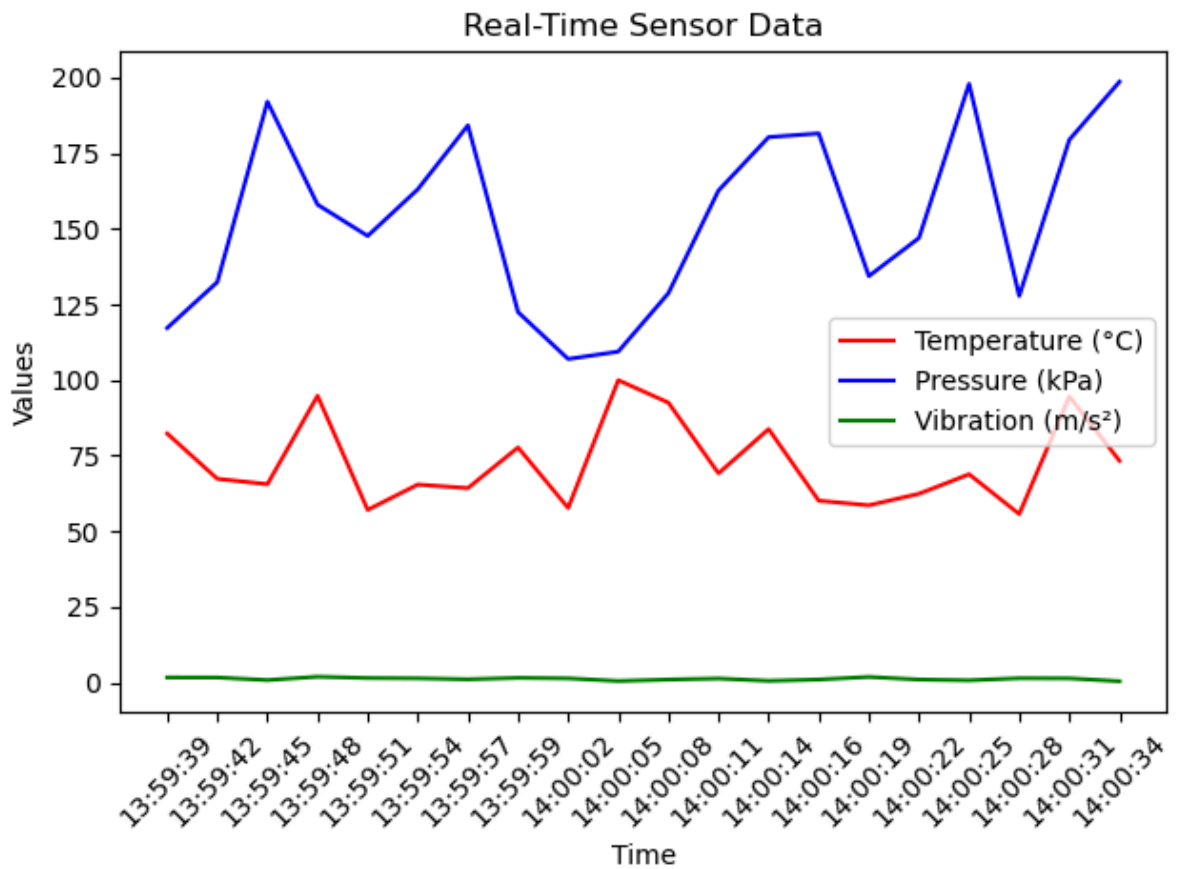
Anomalies at 14:00:25: High Pressure



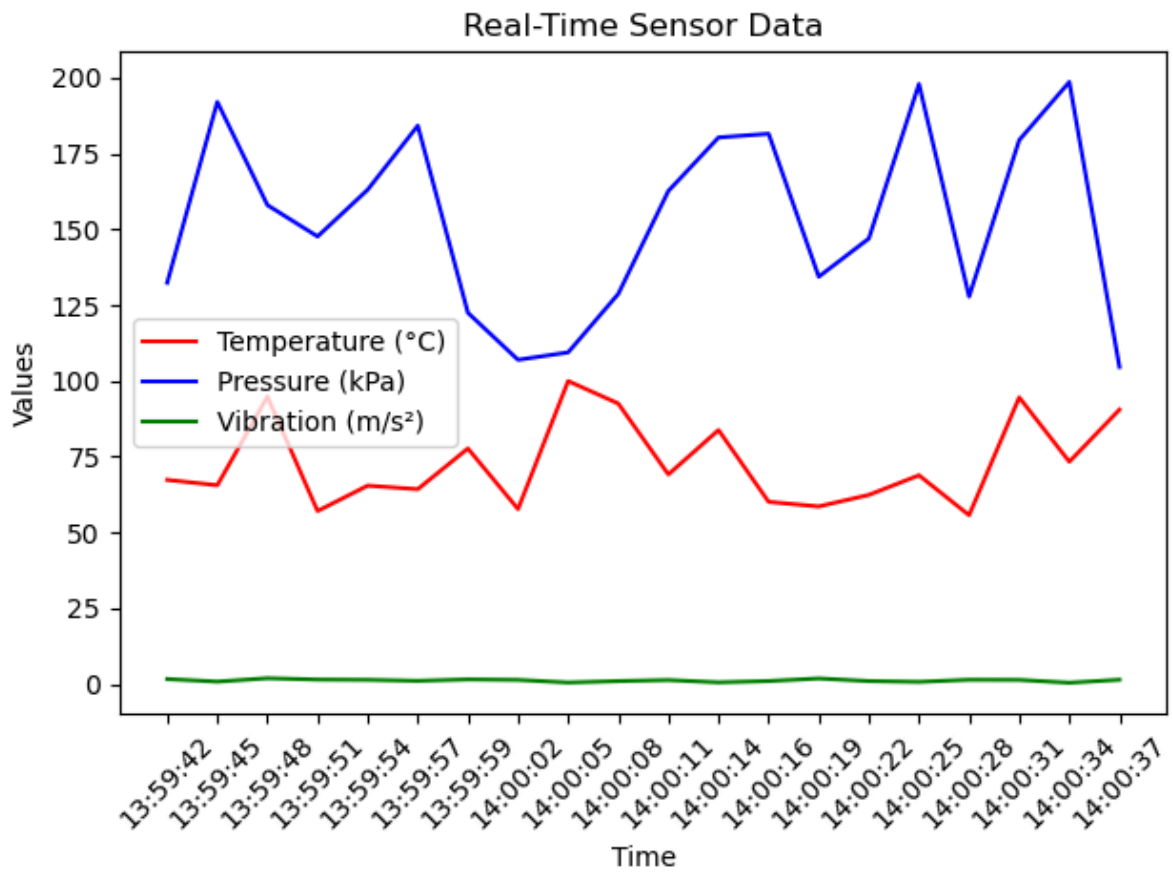
Anomalies at 14:00:31: High Temperature, High Pressure



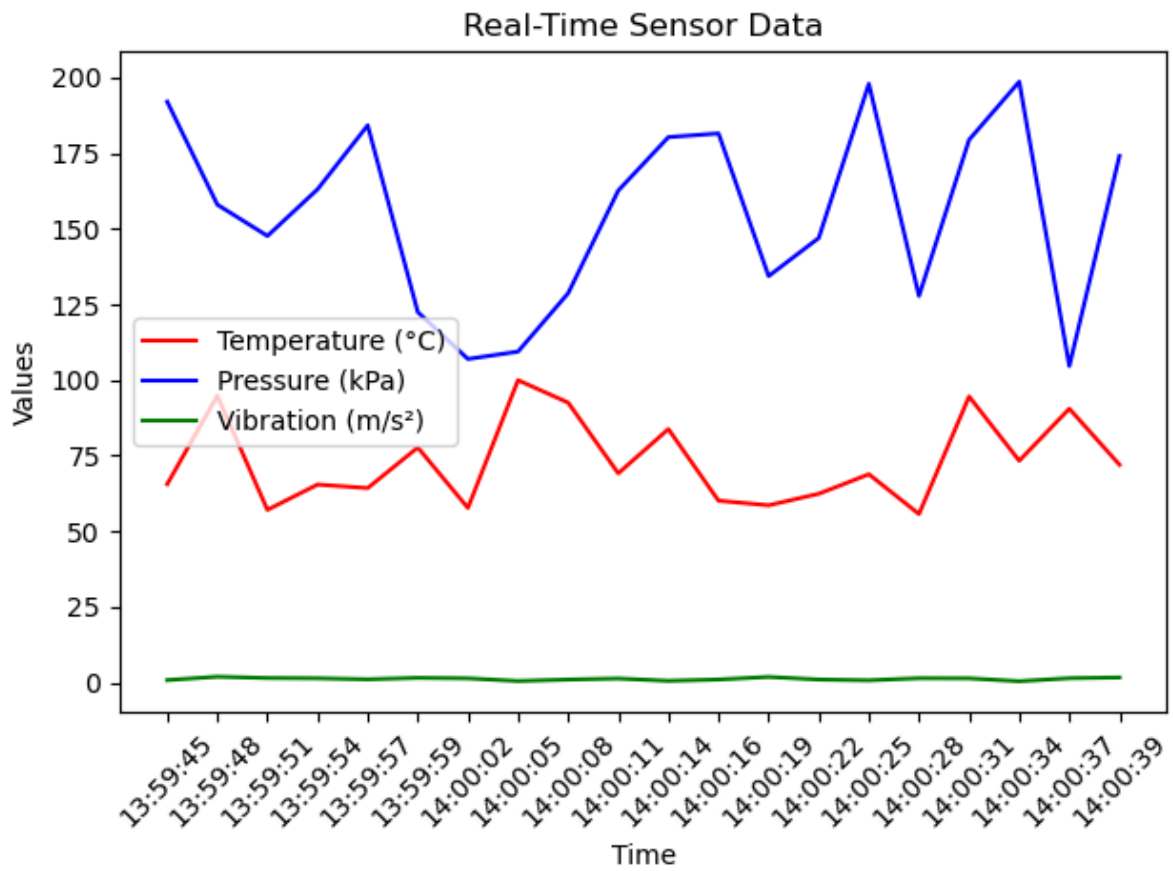
Anomalies at 14:00:34: High Pressure



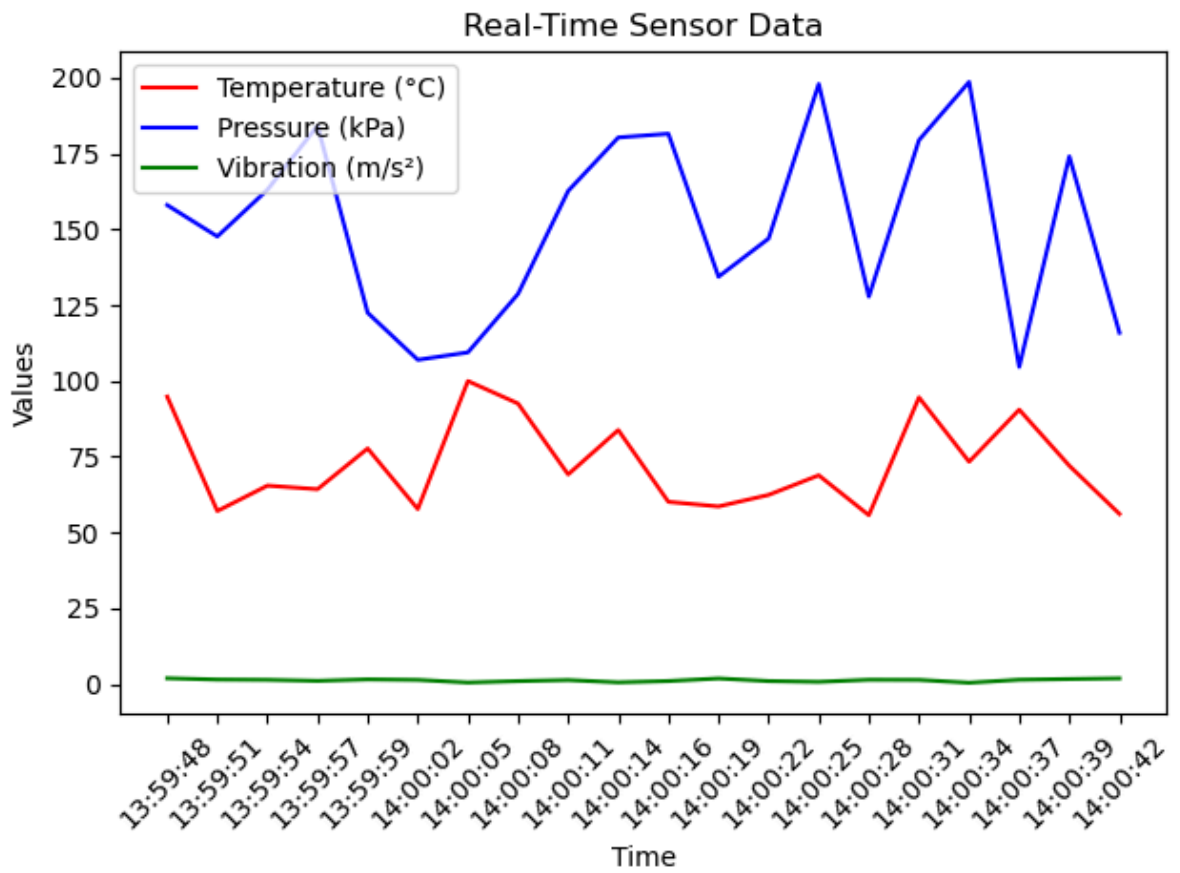
Anomalies at 14:00:37: High Temperature, High Vibration



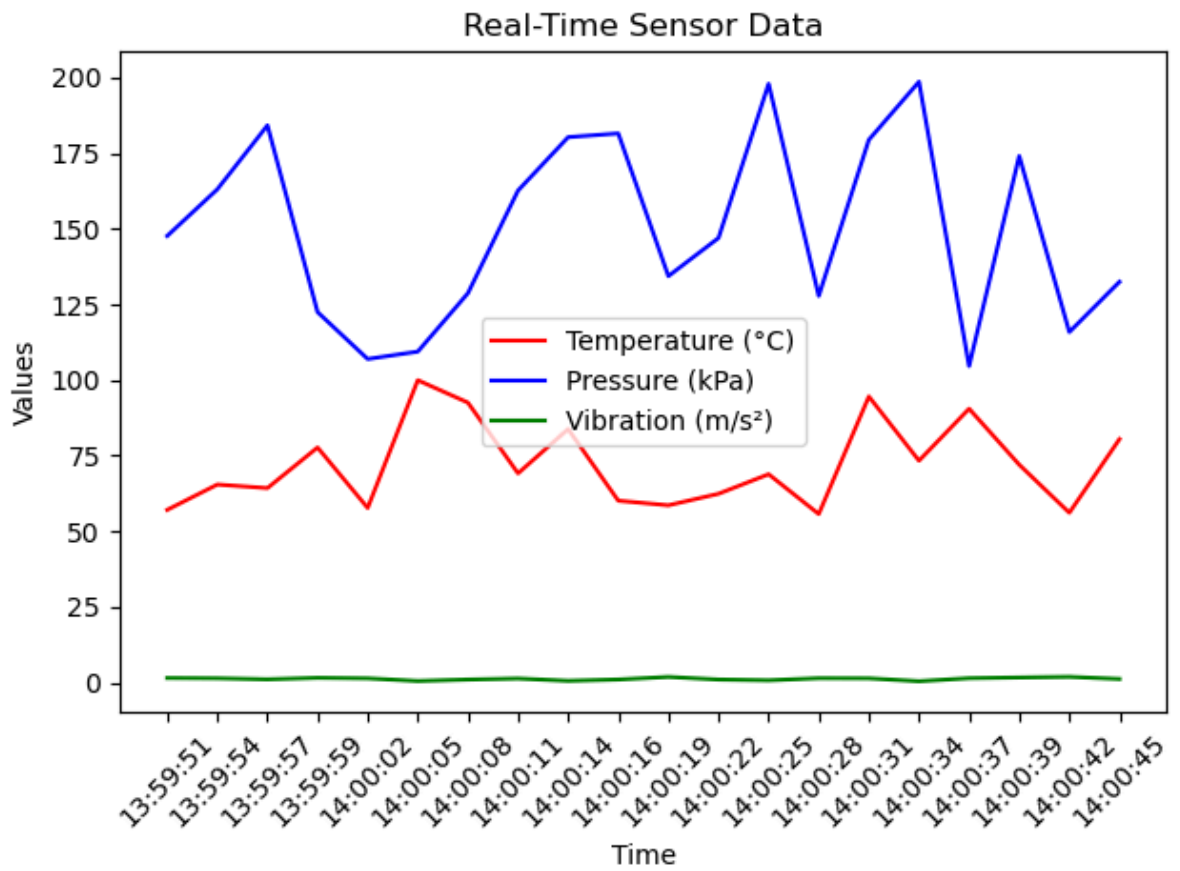
Anomalies at 14:00:39: High Pressure, High Vibration

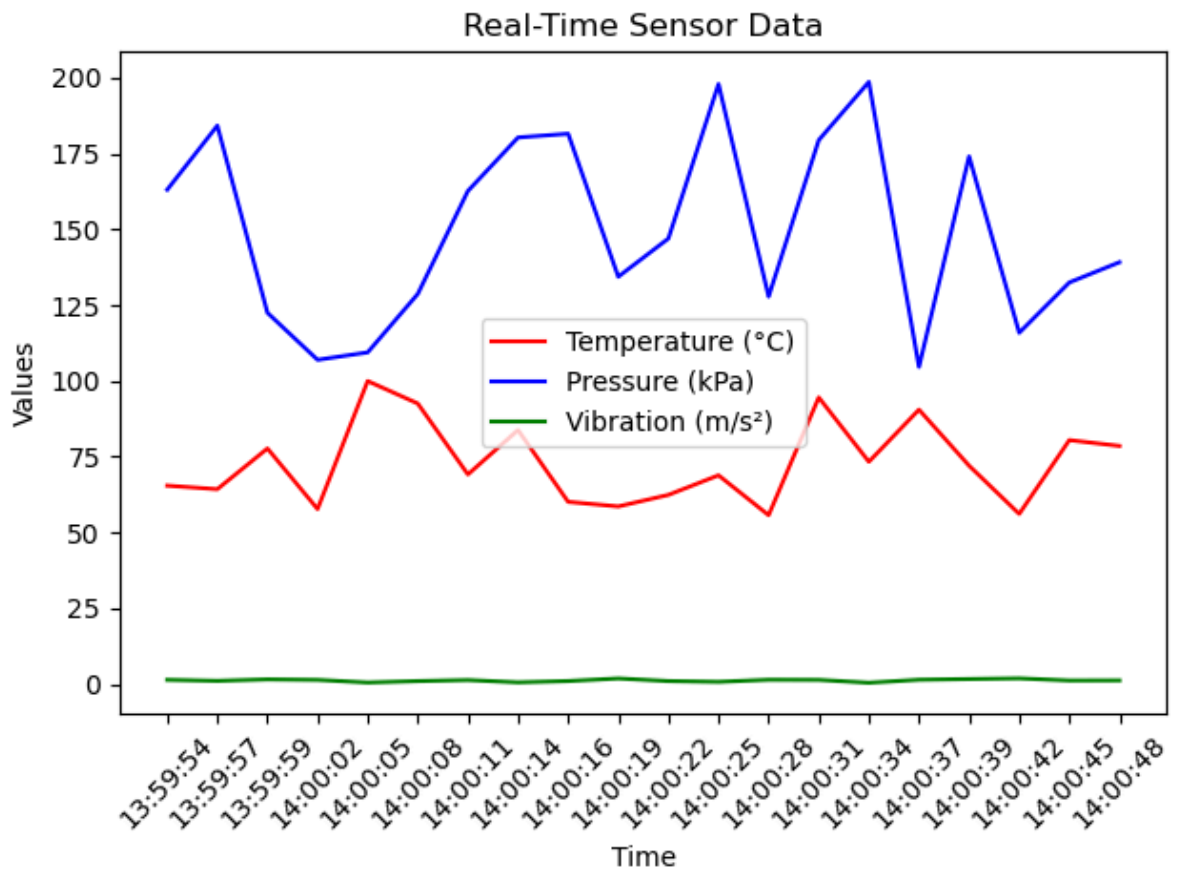


Anomalies at 14:00:42: High Vibration

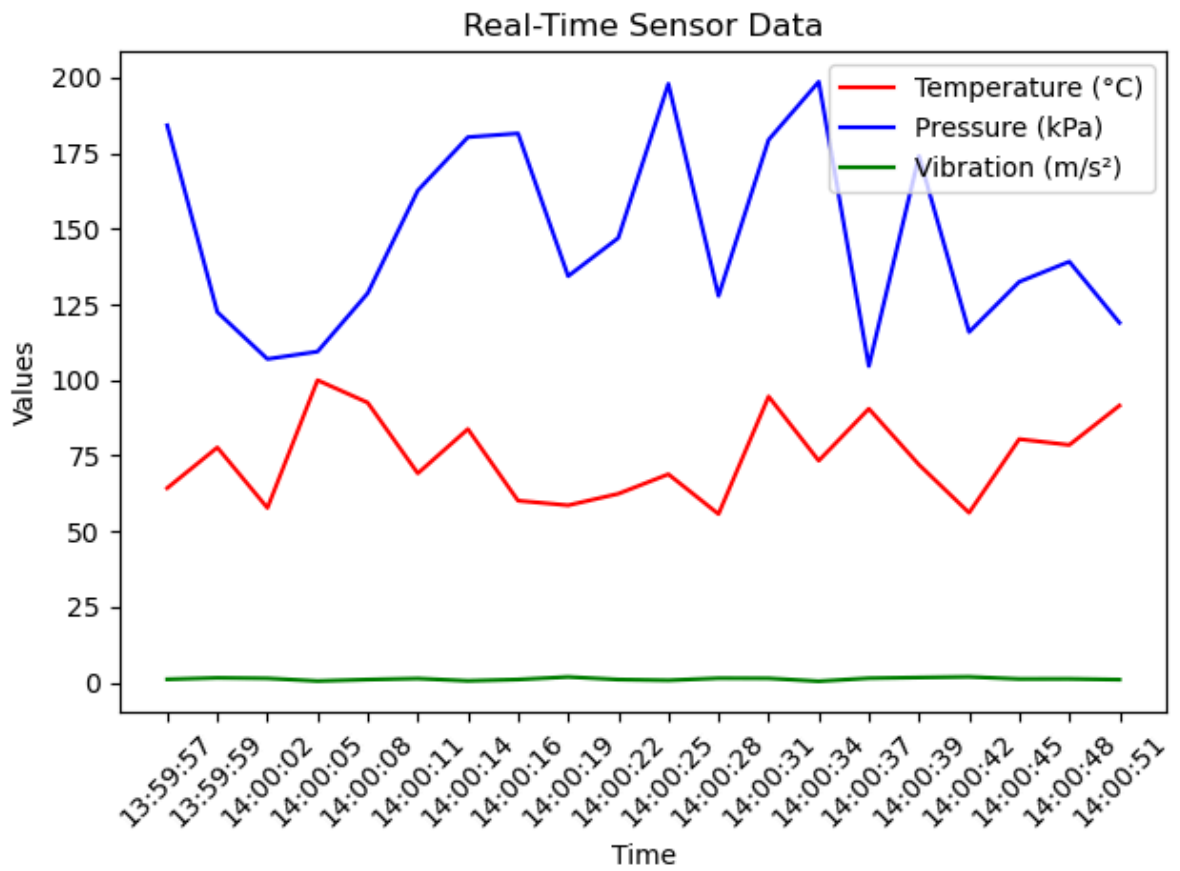


Anomalies at 14:00:45: High Temperature

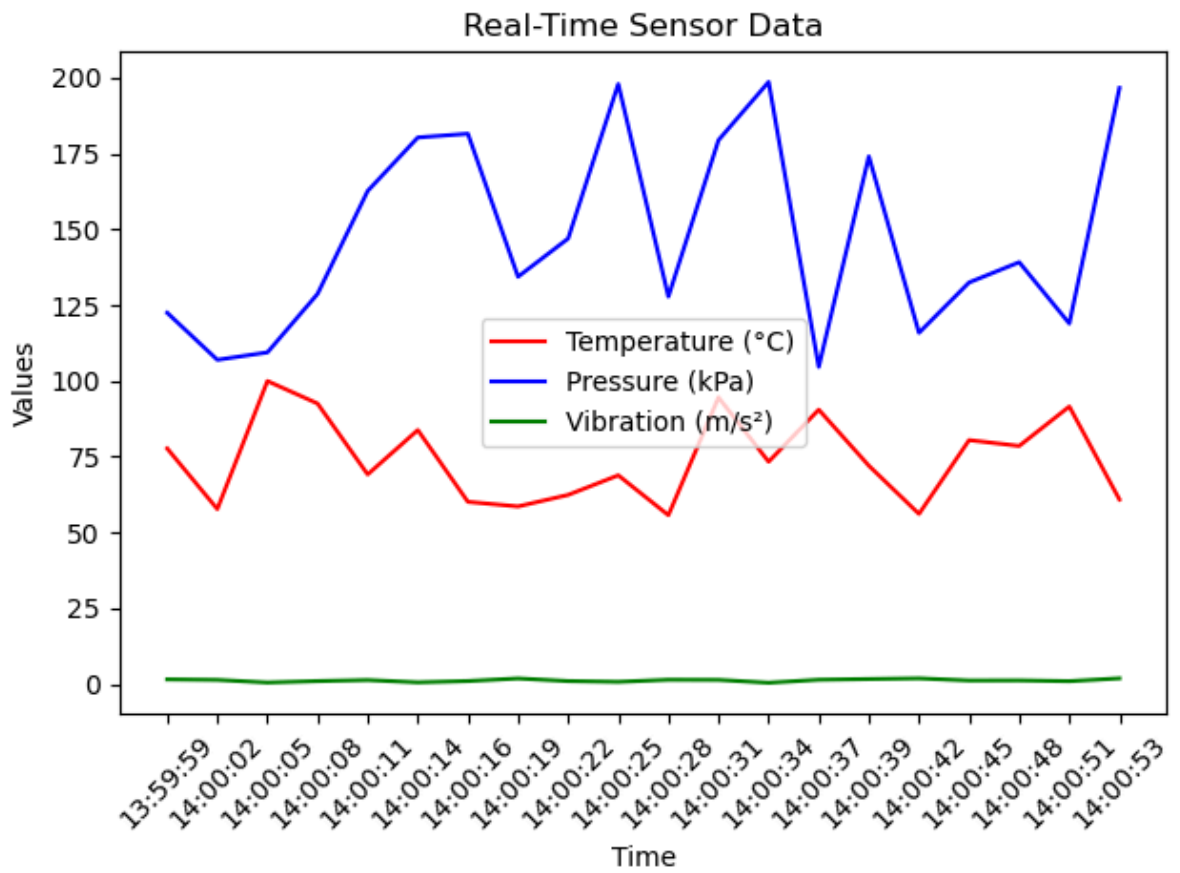




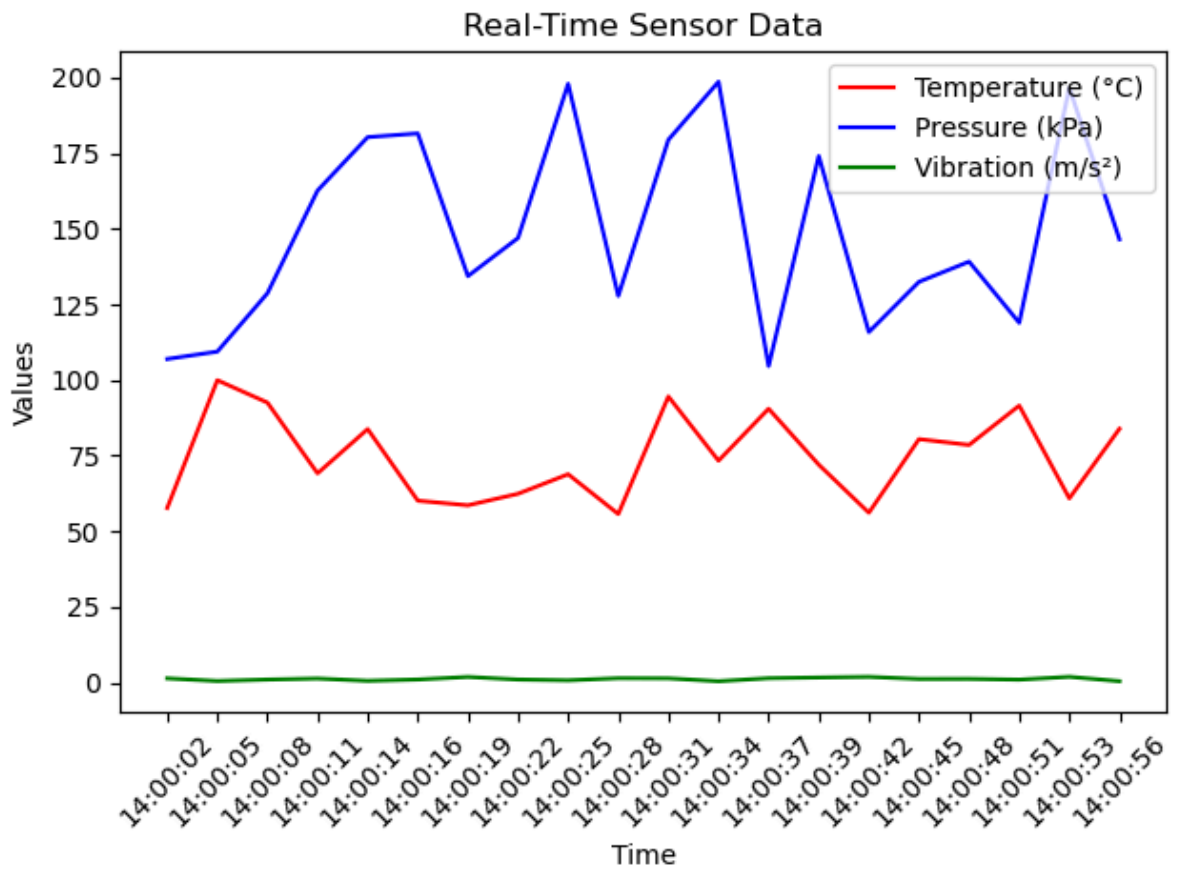
Anomalies at 14:00:51: High Temperature



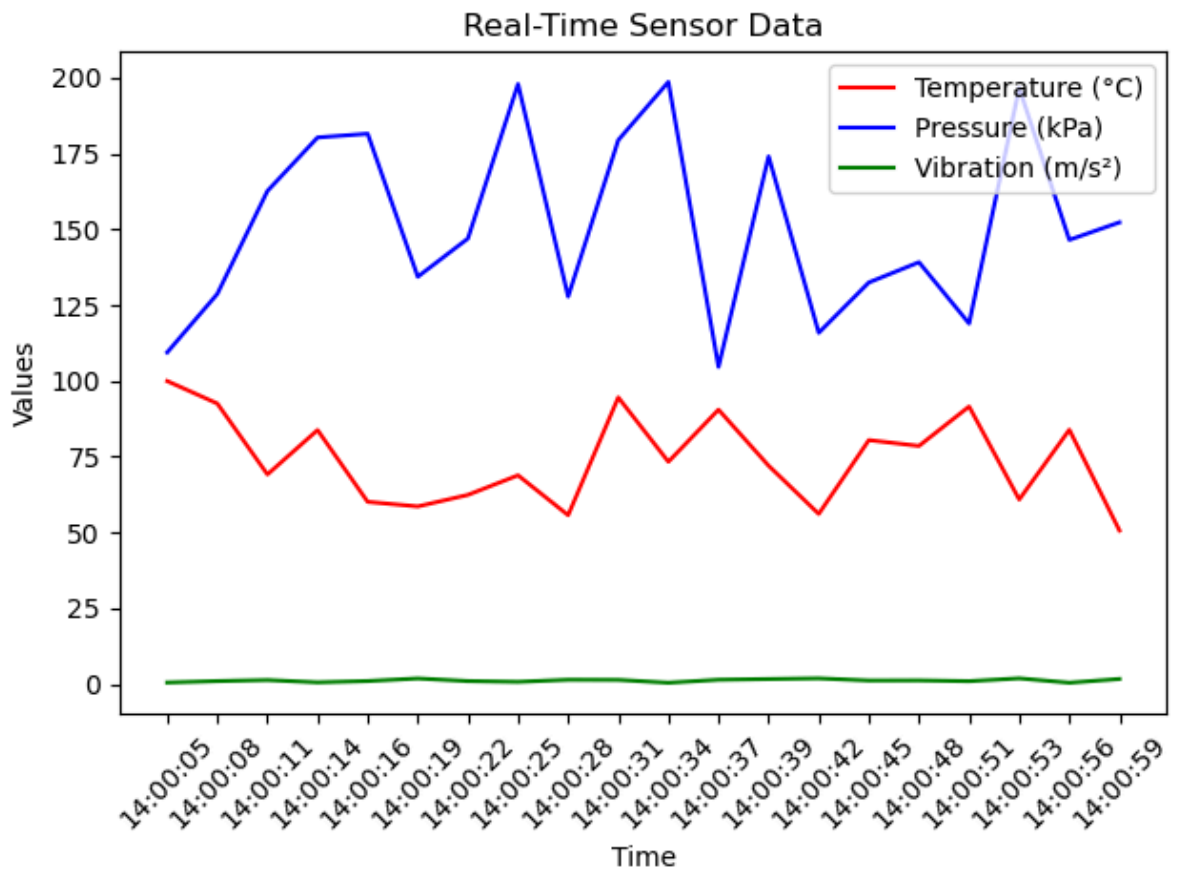
Anomalies at 14:00:53: High Pressure, High Vibration



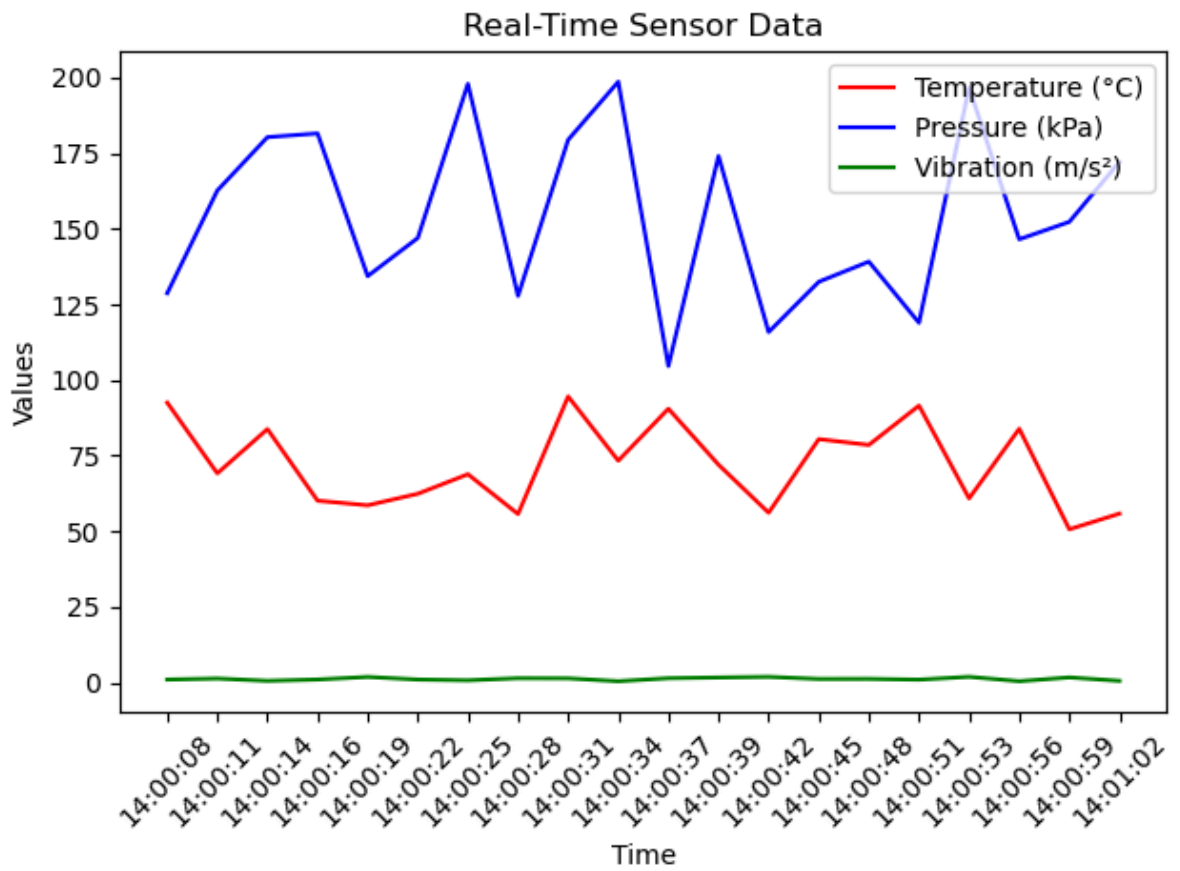
Anomalies at 14:00:56: High Temperature

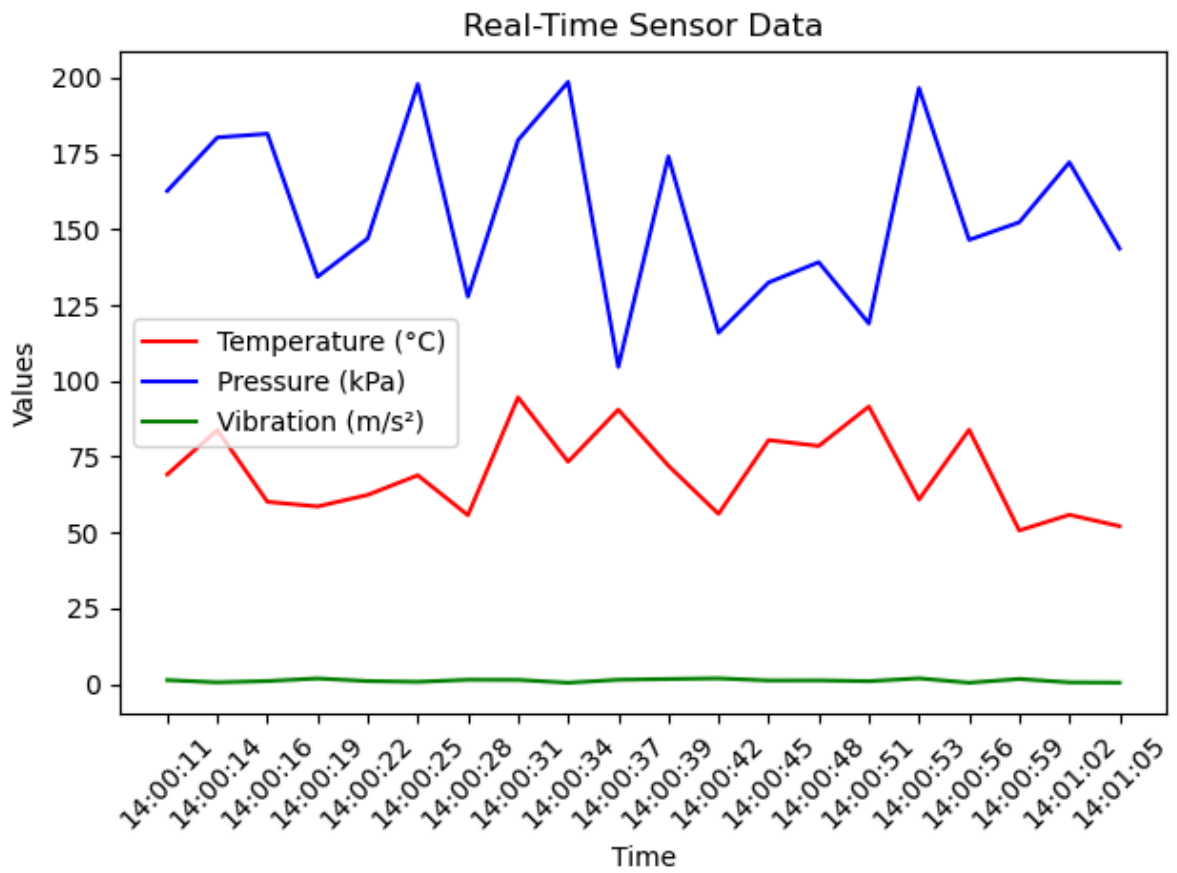


Anomalies at 14:00:59: High Pressure, High Vibration

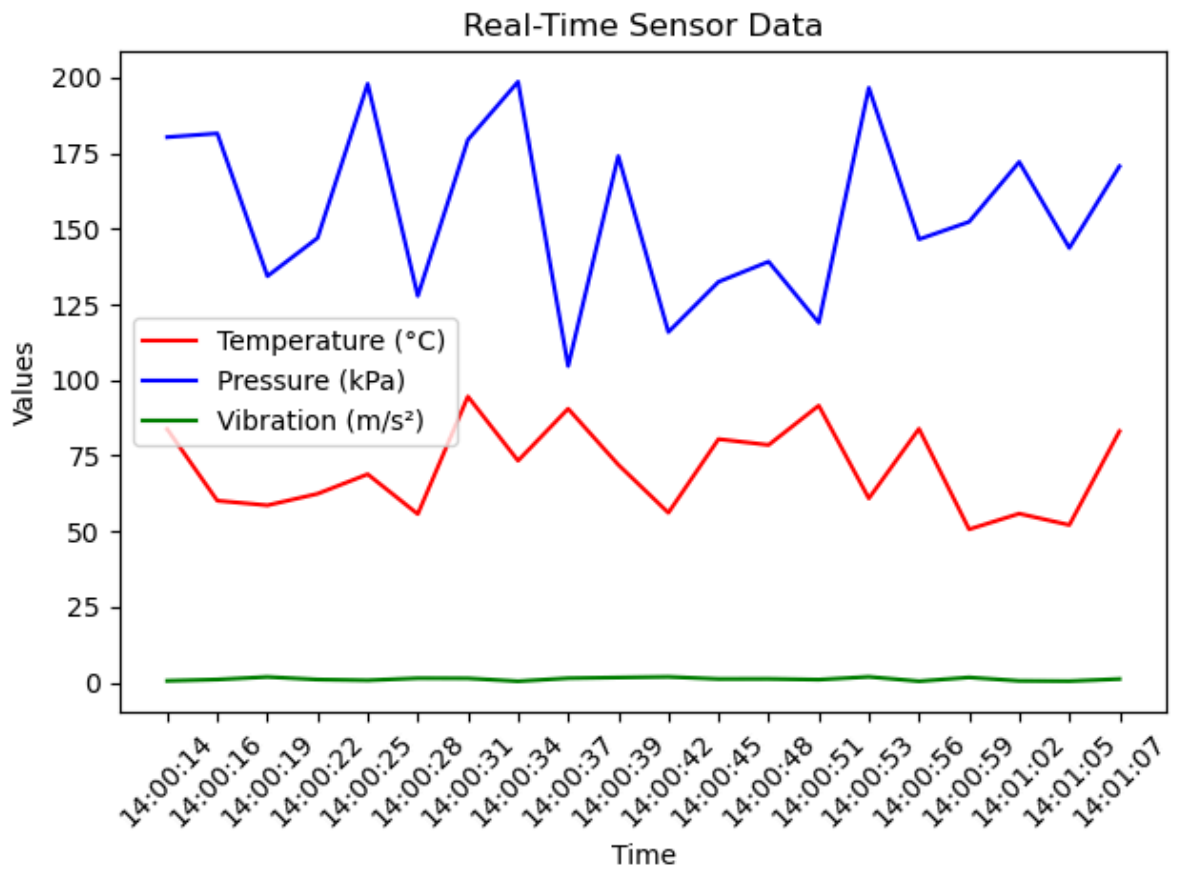


Anomalies at 14:01:02: High Pressure

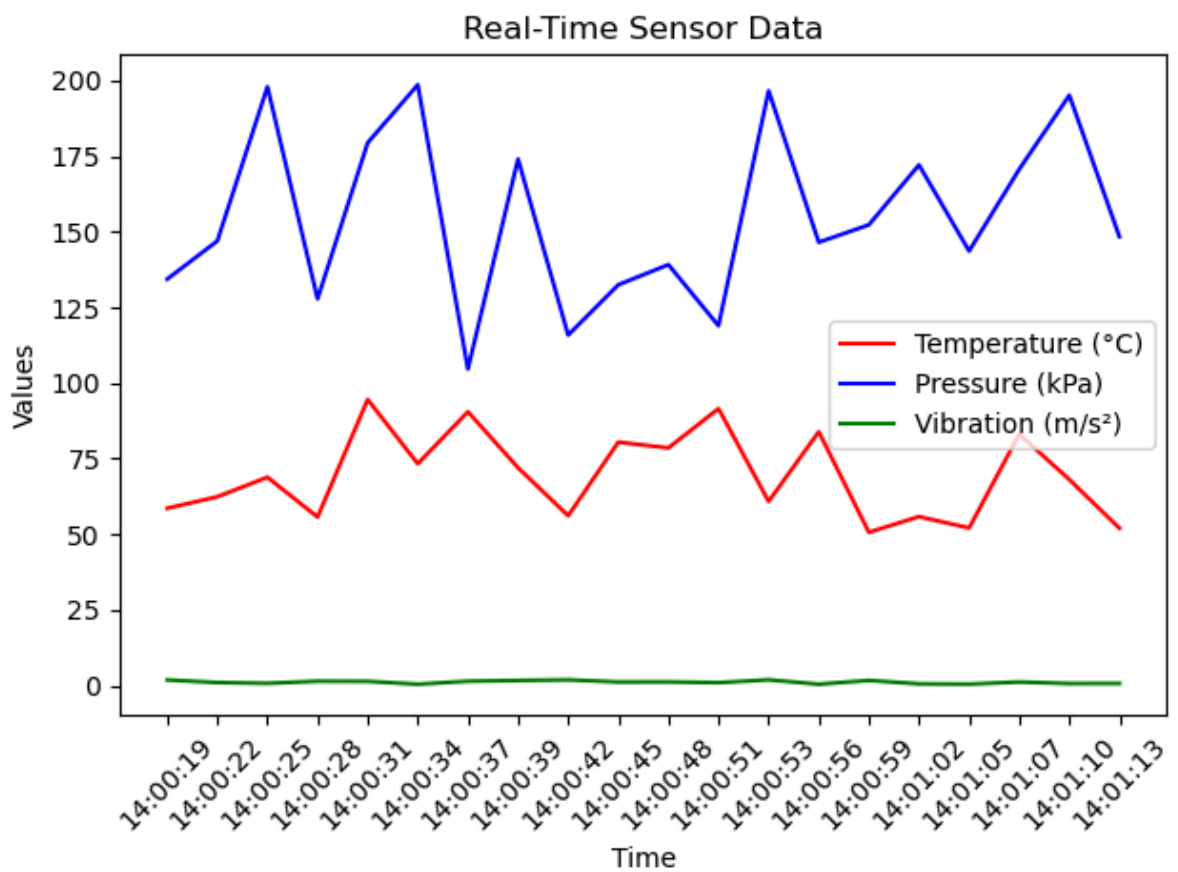
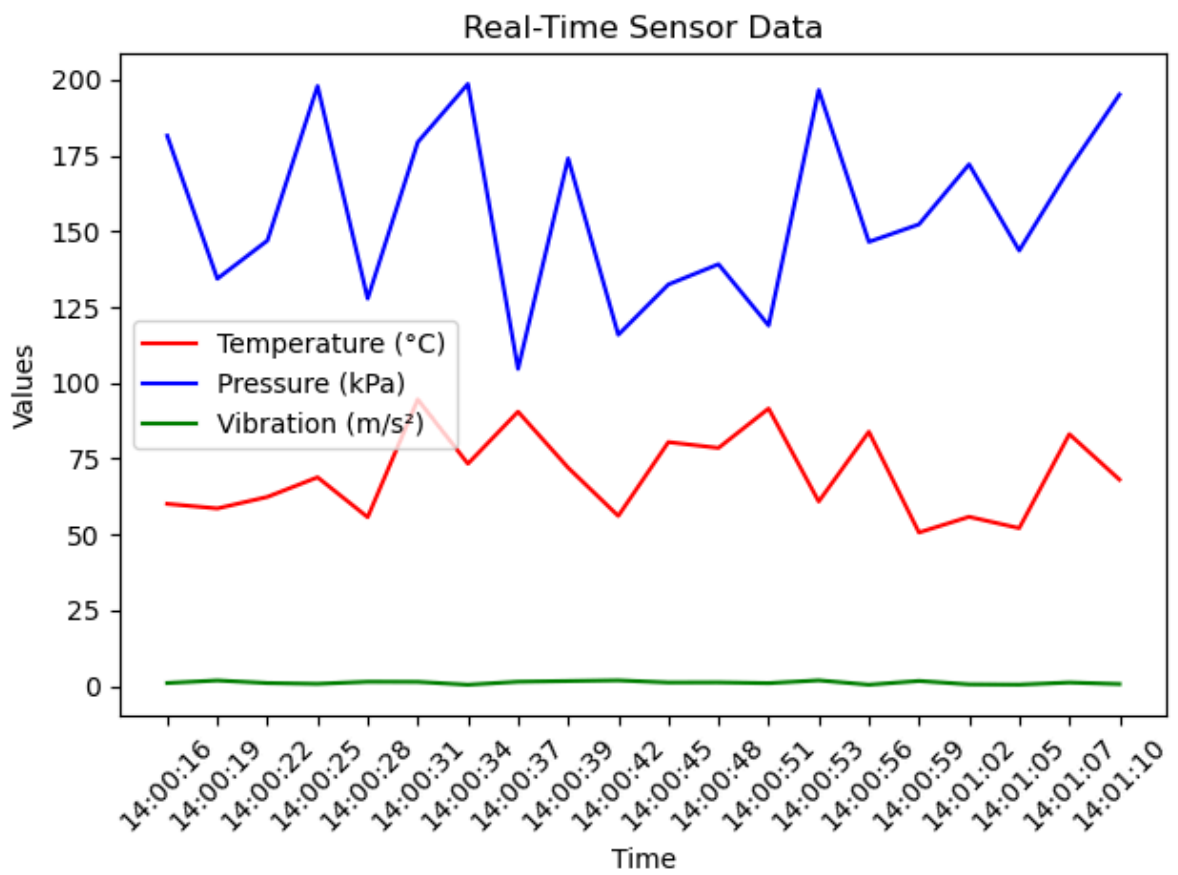


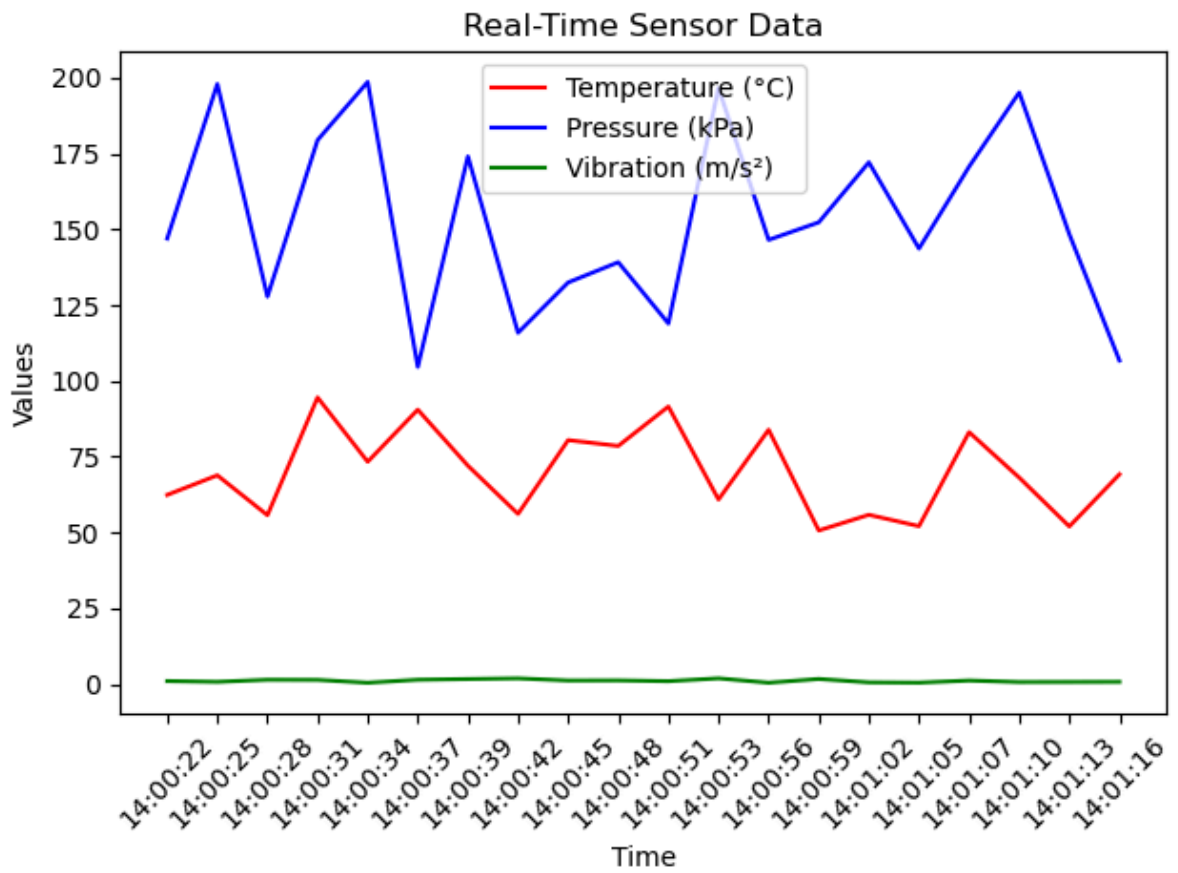


Anomalies at 14:01:07: High Temperature, High Pressure

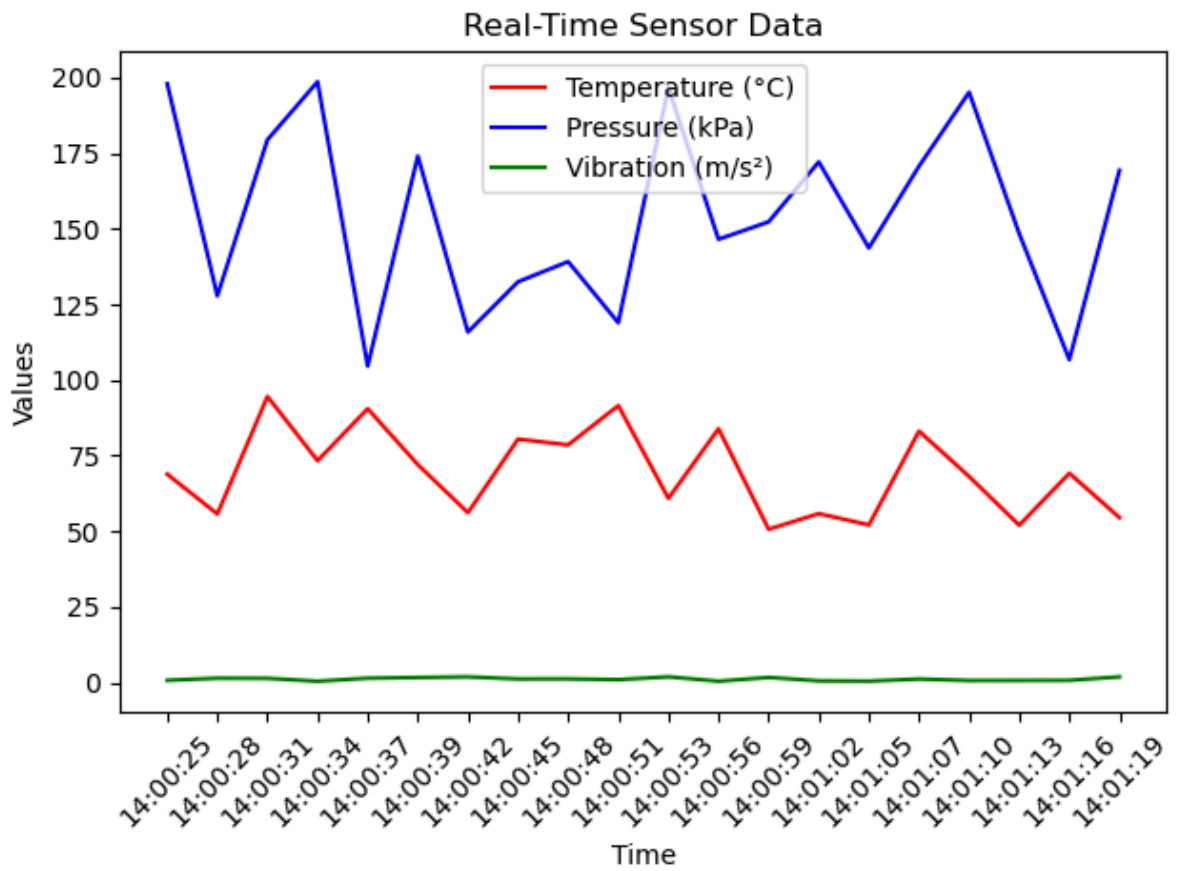


Anomalies at 14:01:10: High Pressure

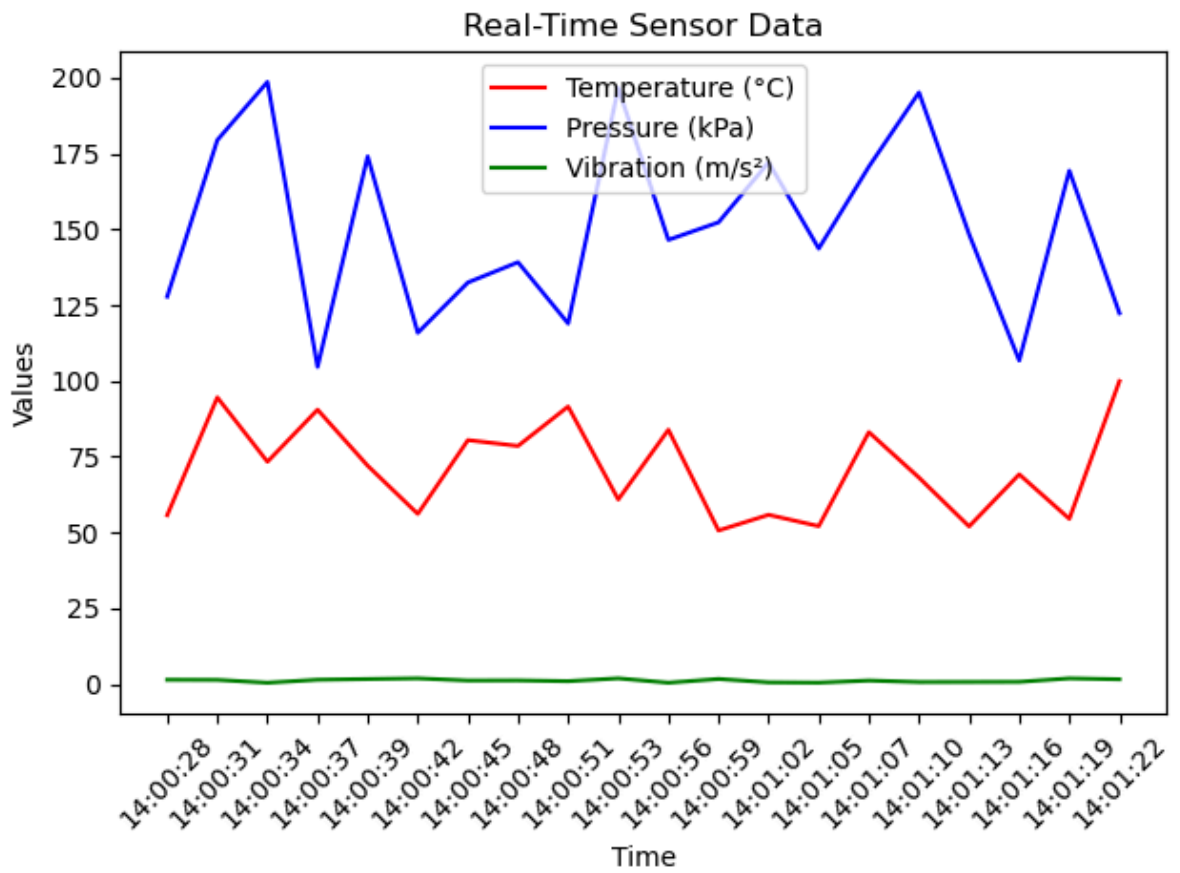




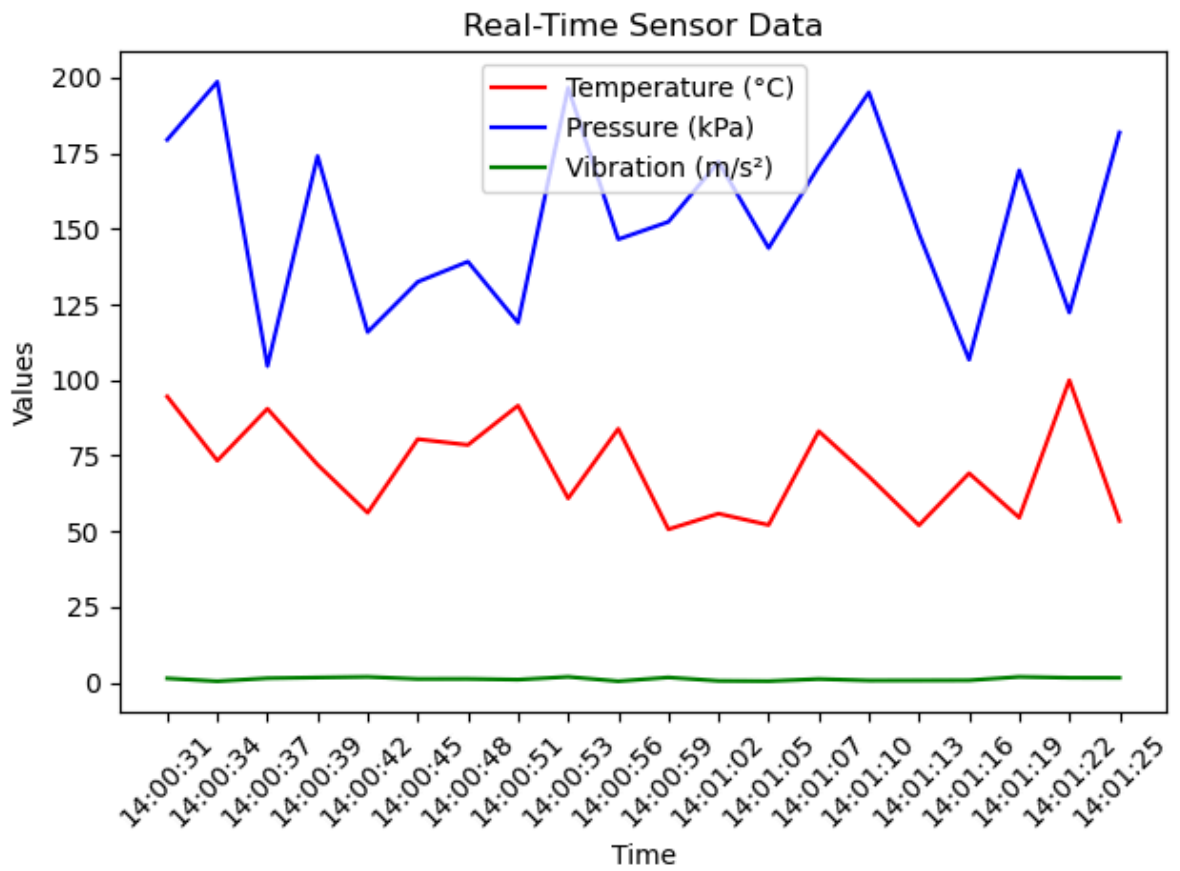
Anomalies at 14:01:19: High Pressure, High Vibration



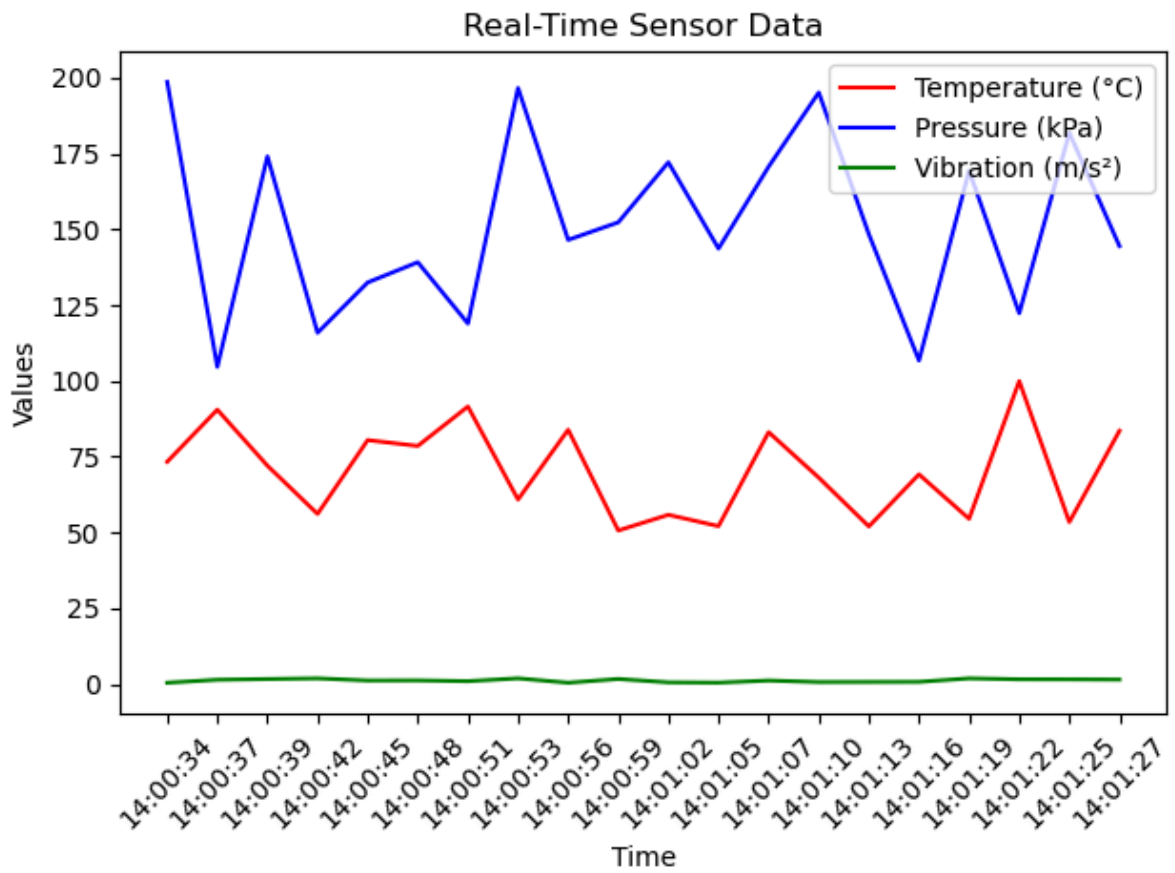
Anomalies at 14:01:22: High Temperature, High Vibration



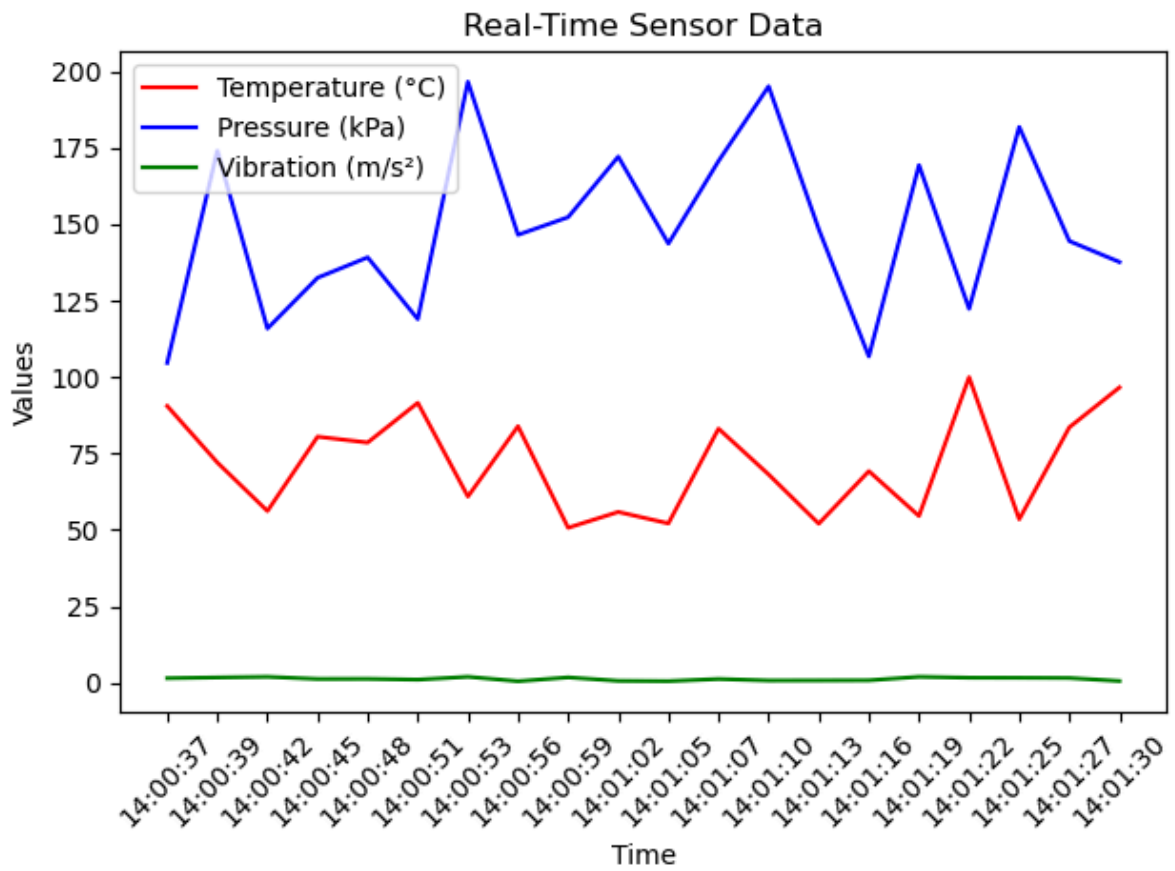
Anomalies at 14:01:25: High Pressure, High Vibration



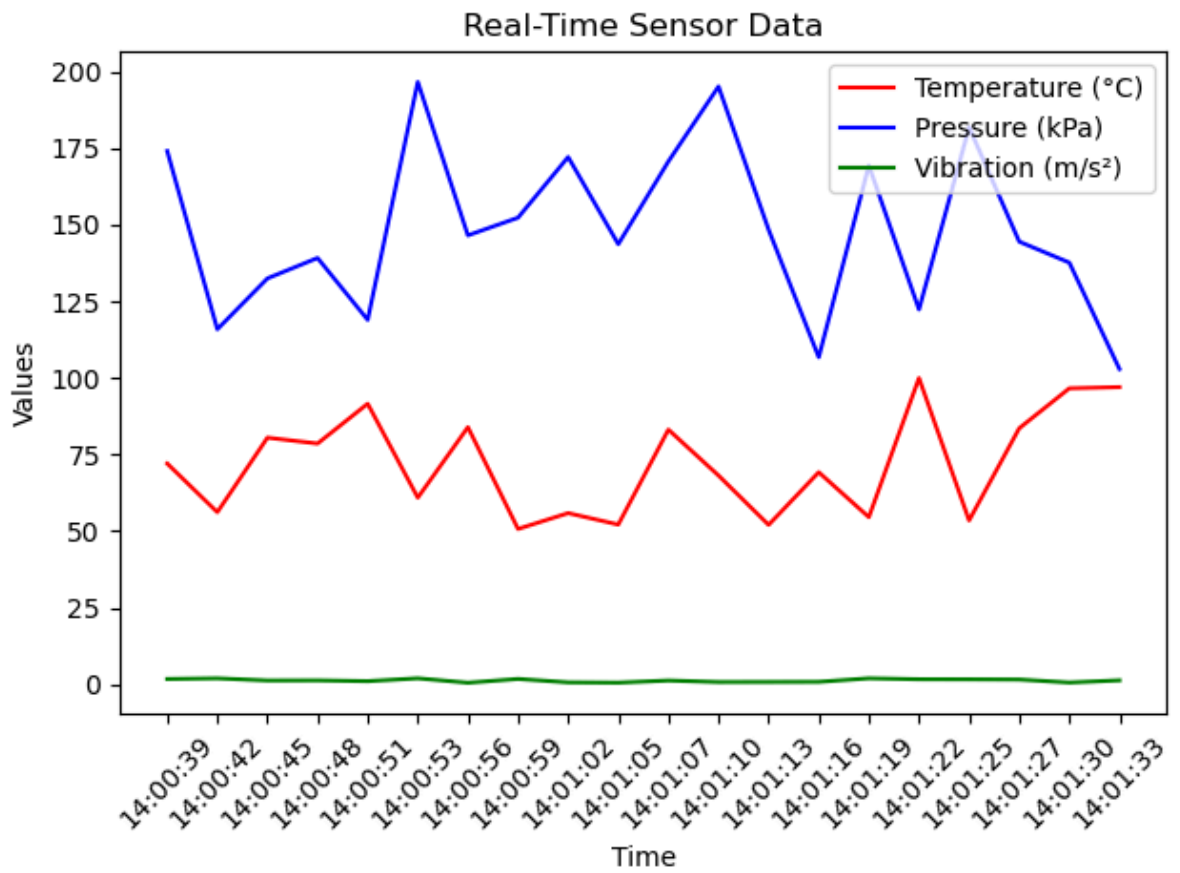
Anomalies at 14:01:27: High Temperature, High Vibration



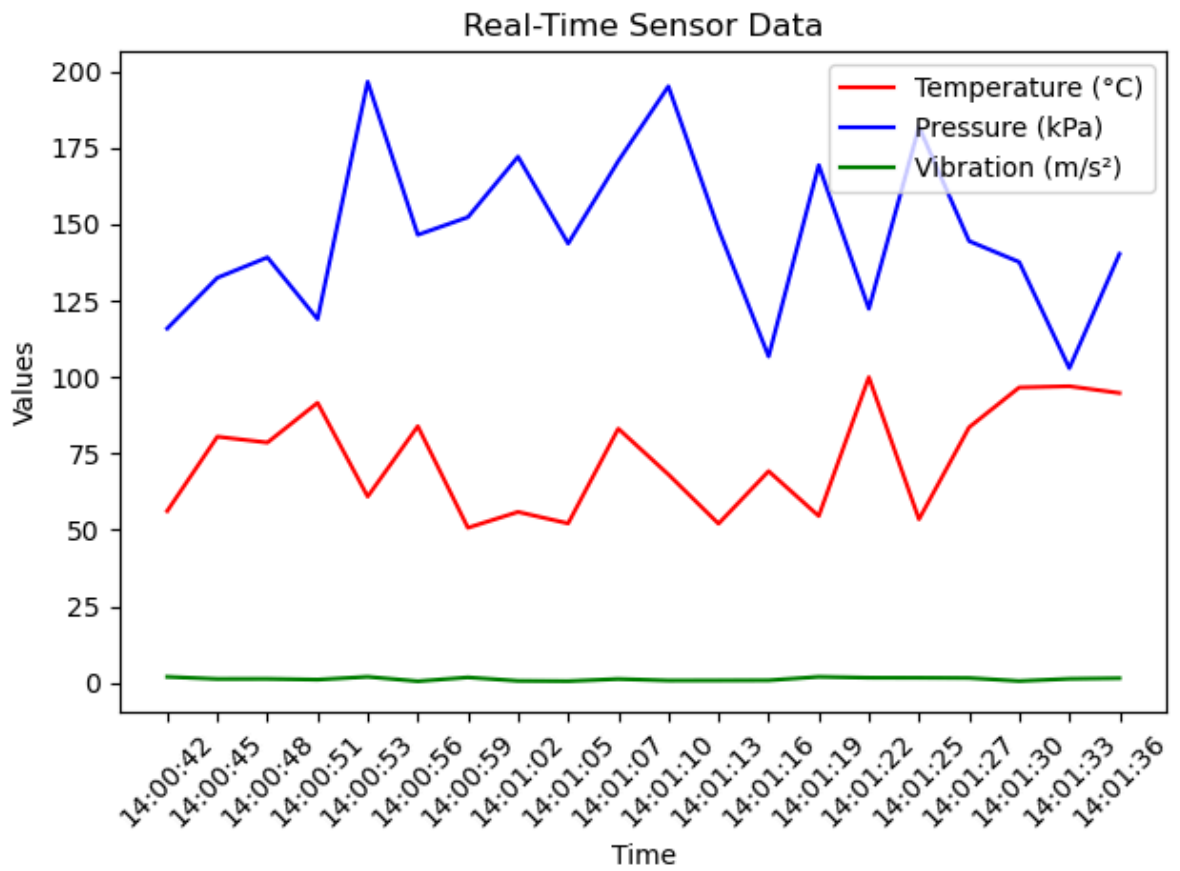
Anomalies at 14:01:30: High Temperature



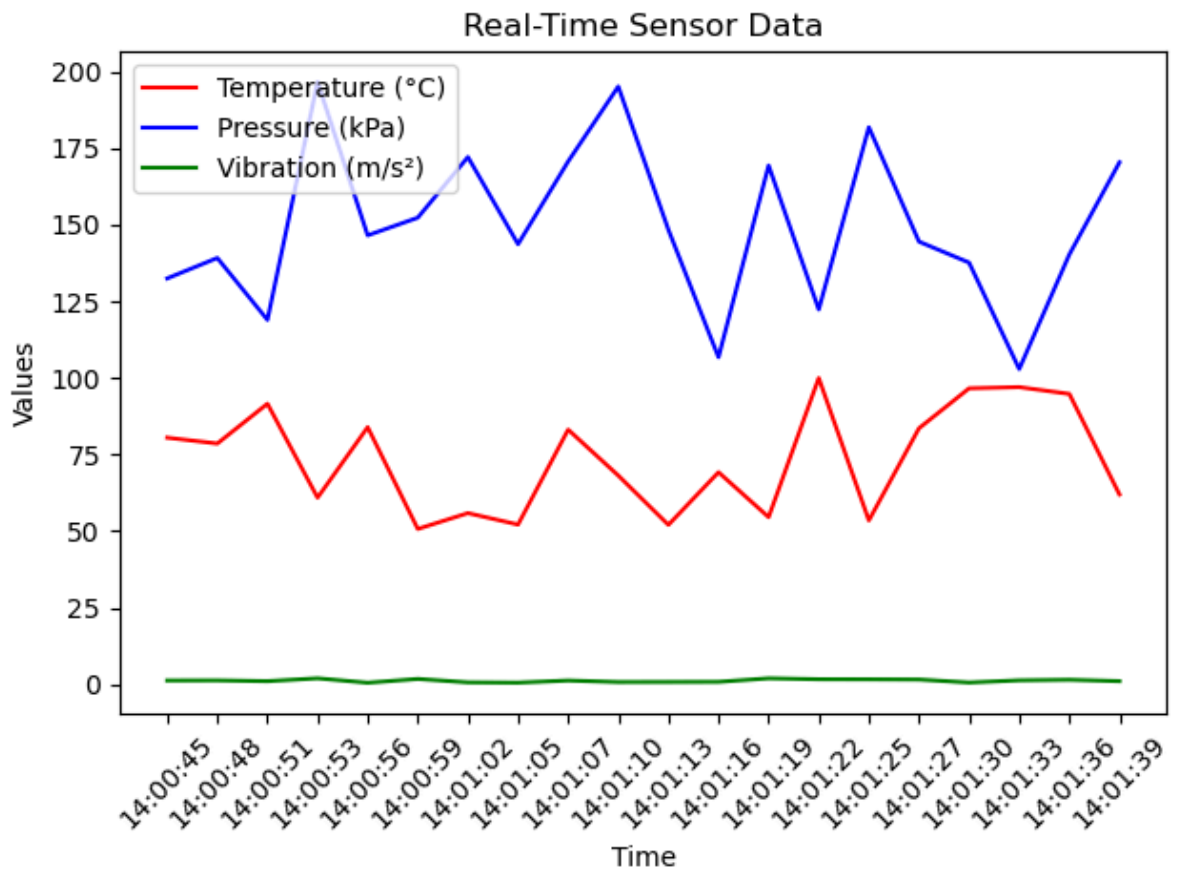
Anomalies at 14:01:33: High Temperature



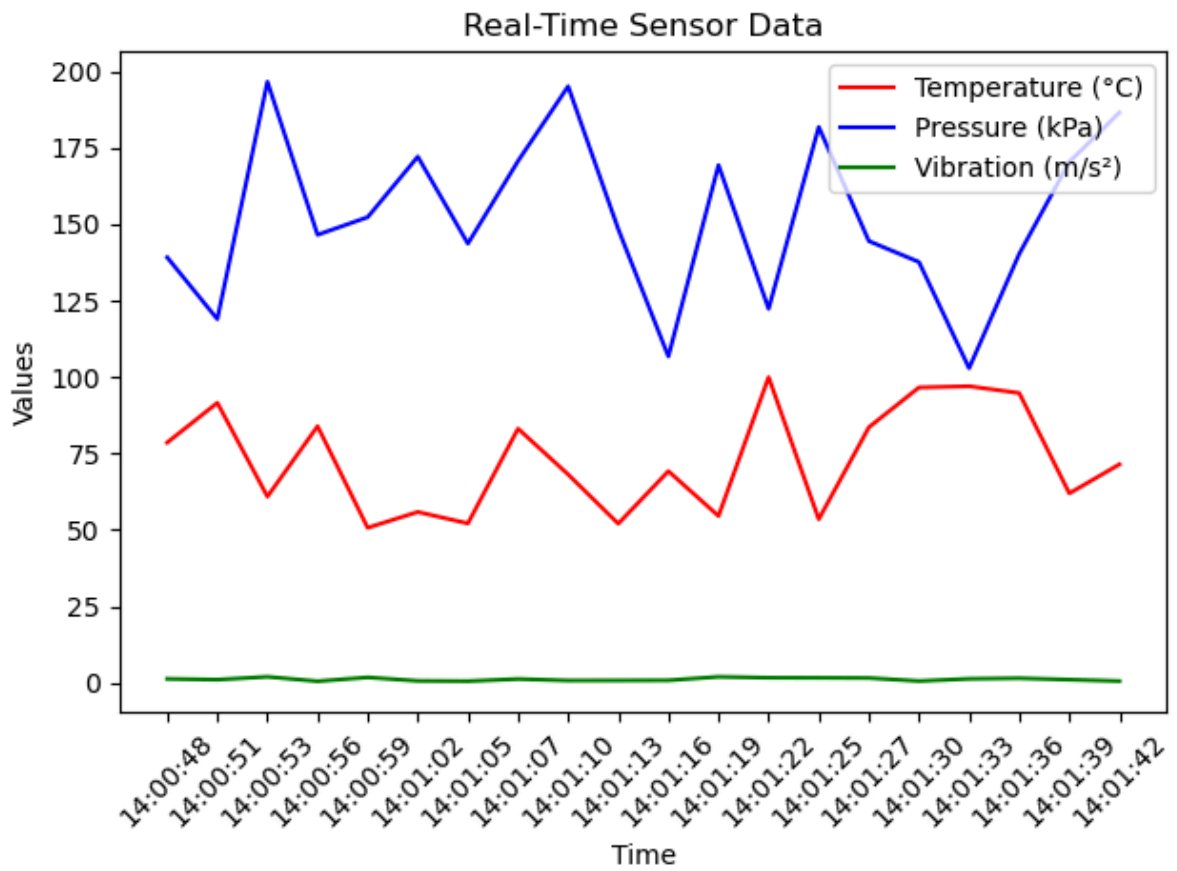
Anomalies at 14:01:36: High Temperature



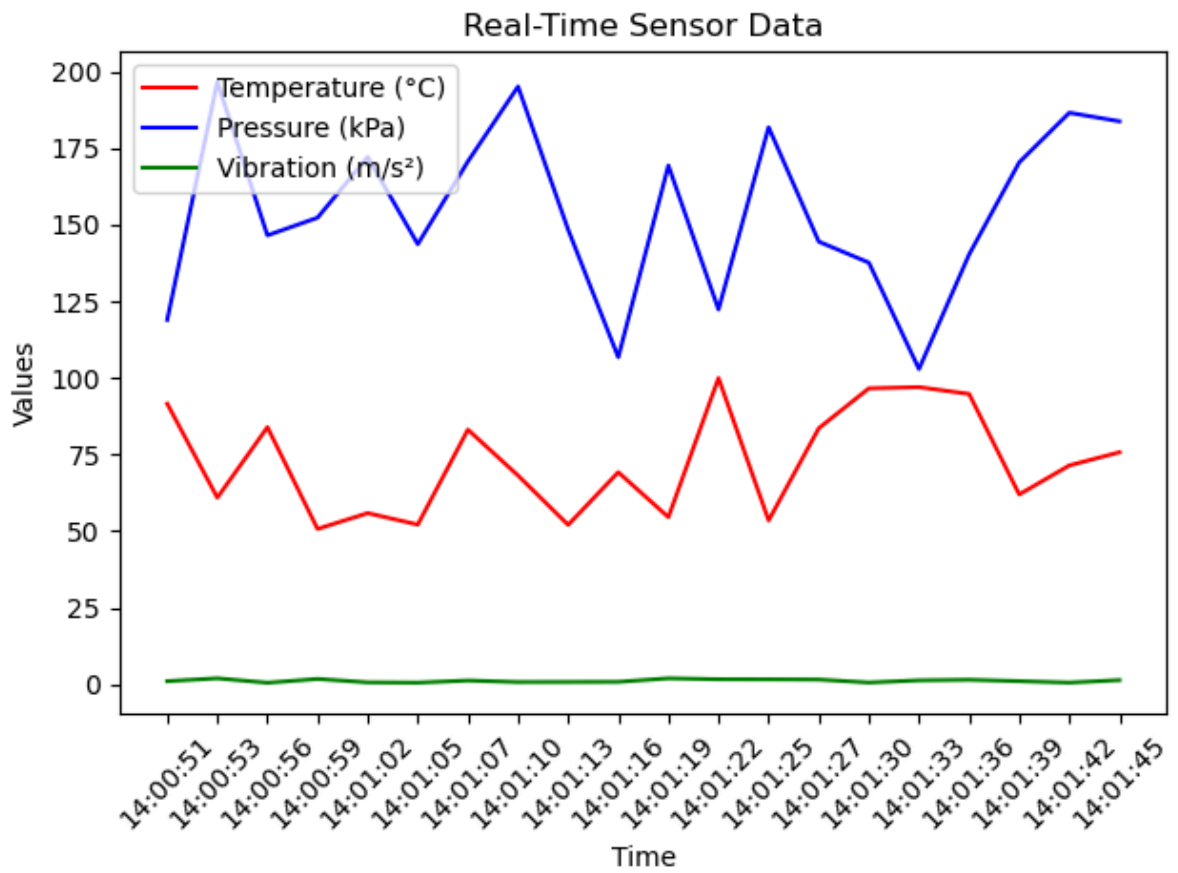
Anomalies at 14:01:39: High Pressure



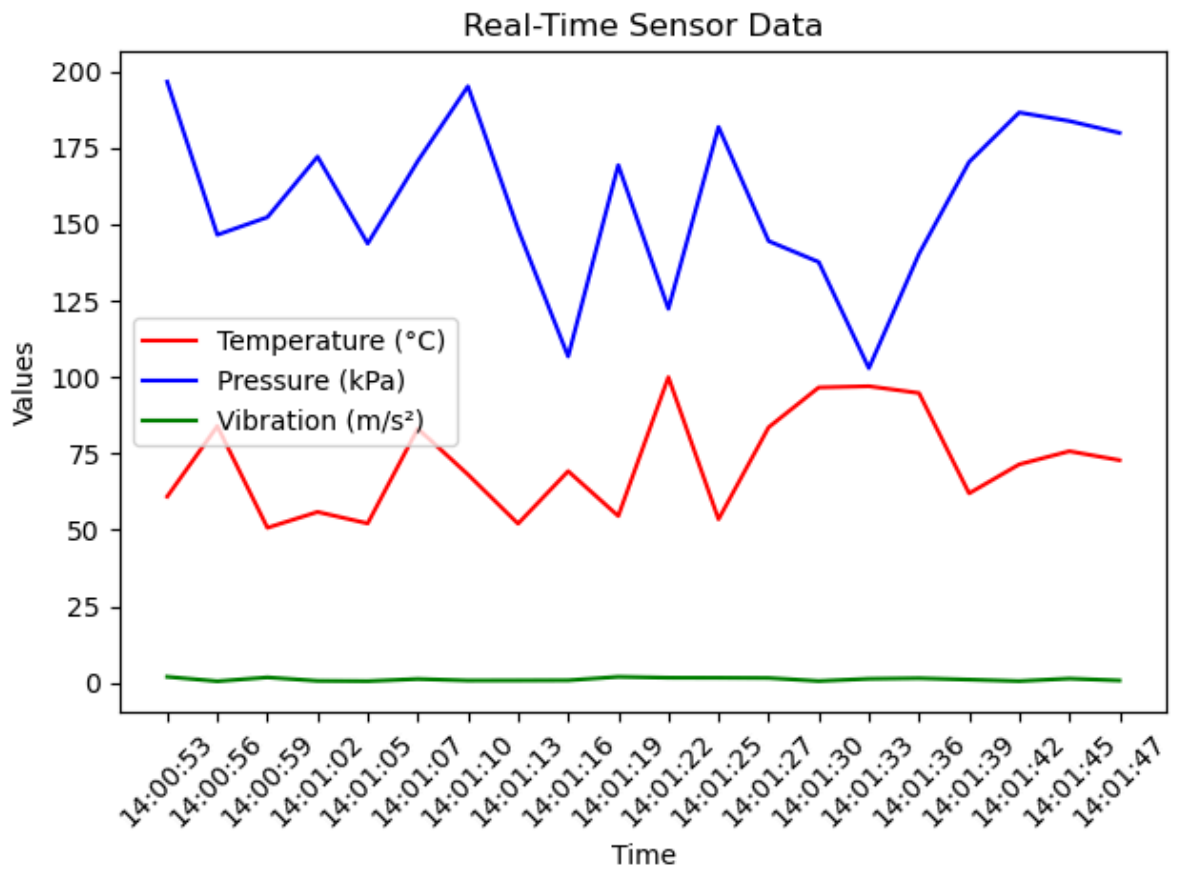
Anomalies at 14:01:42: High Pressure



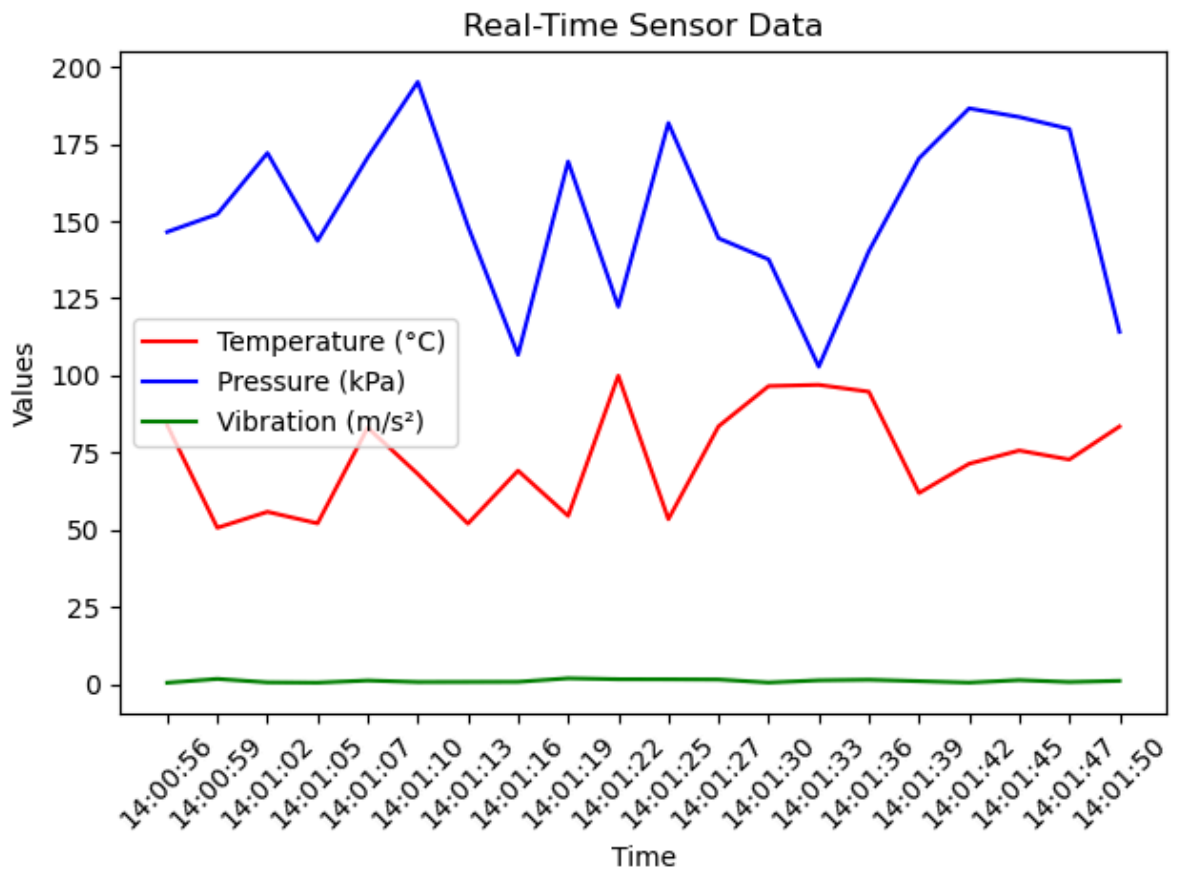
Anomalies at 14:01:45: High Pressure



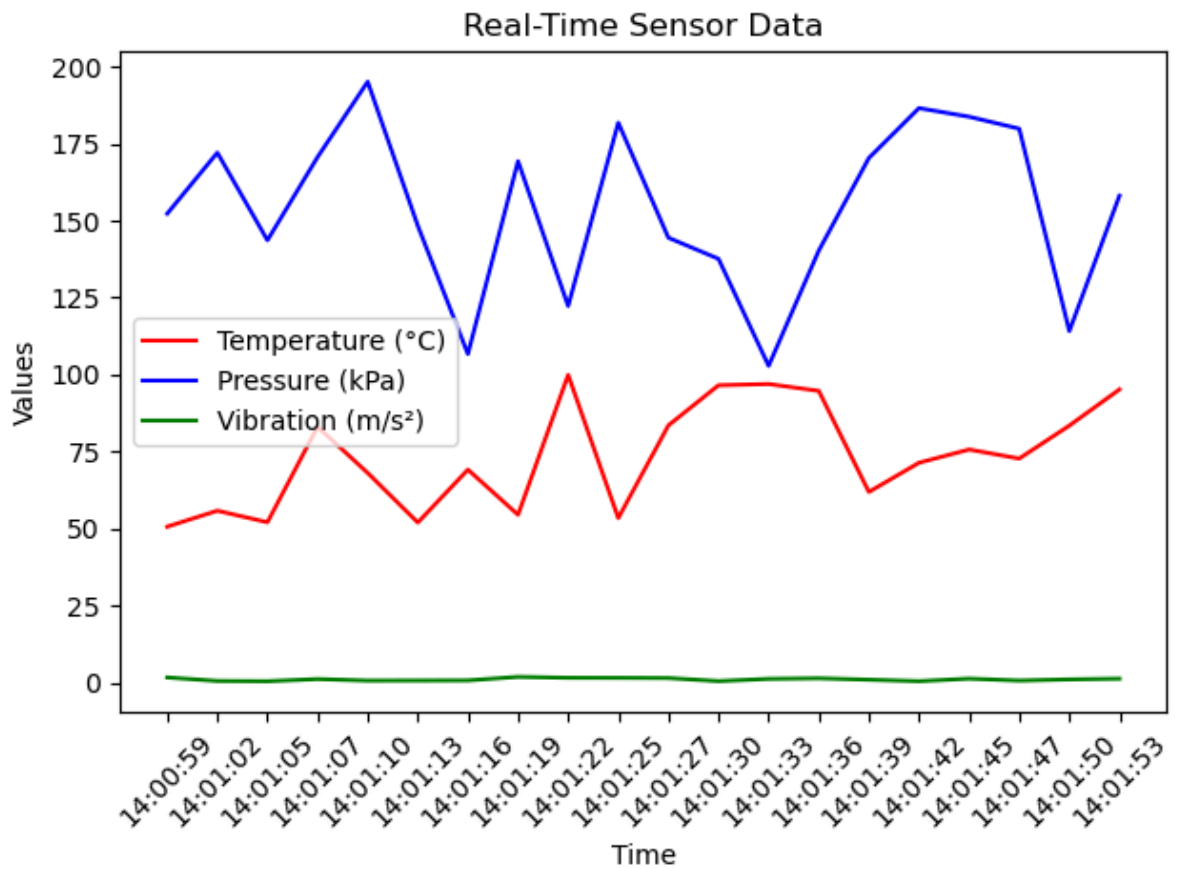
Anomalies at 14:01:47: High Pressure



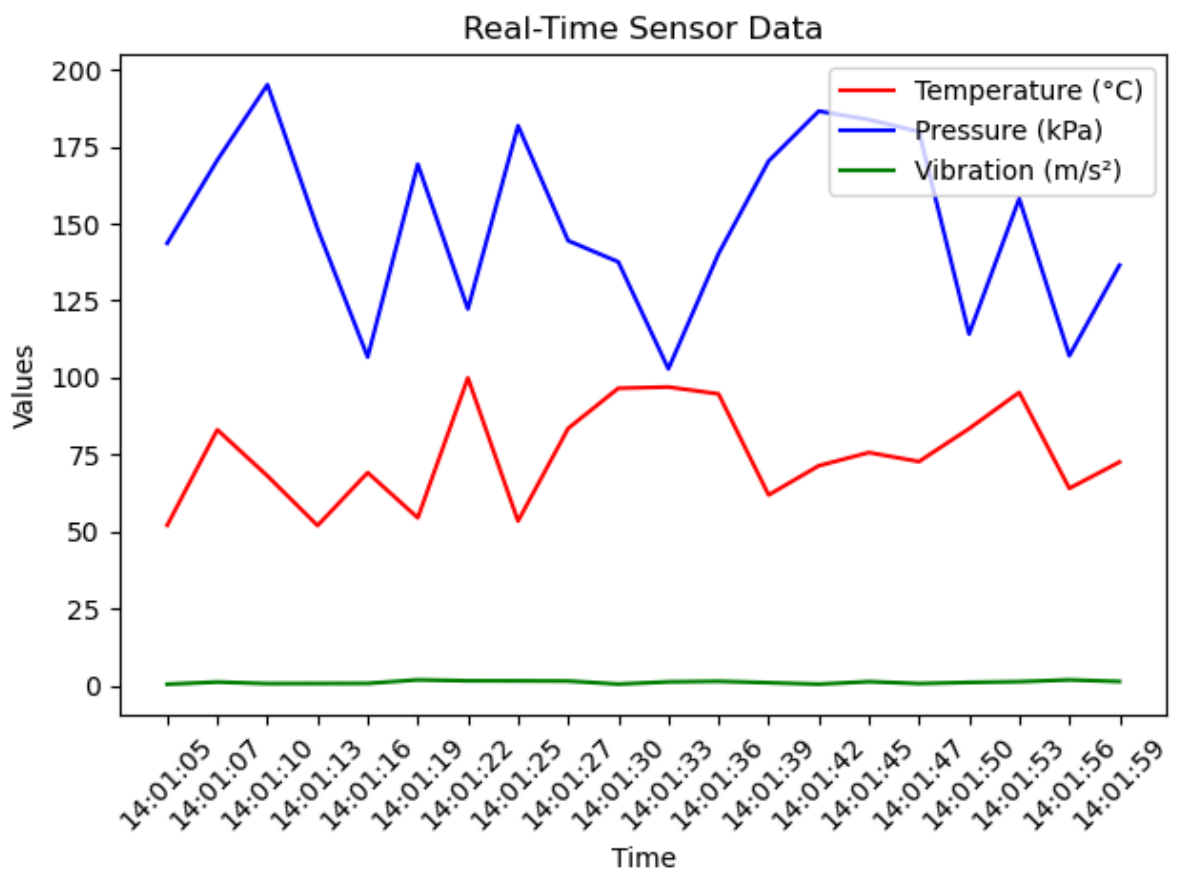
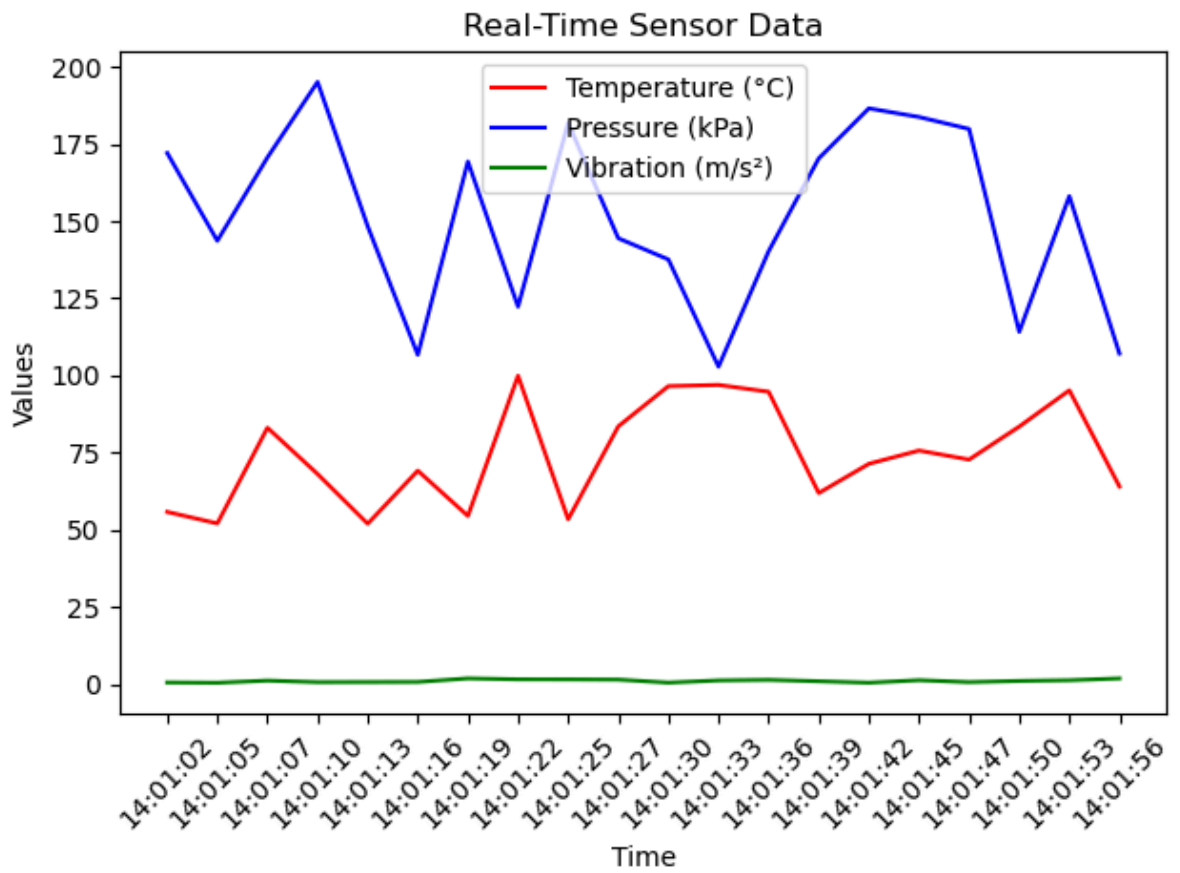
Anomalies at 14:01:50: High Temperature



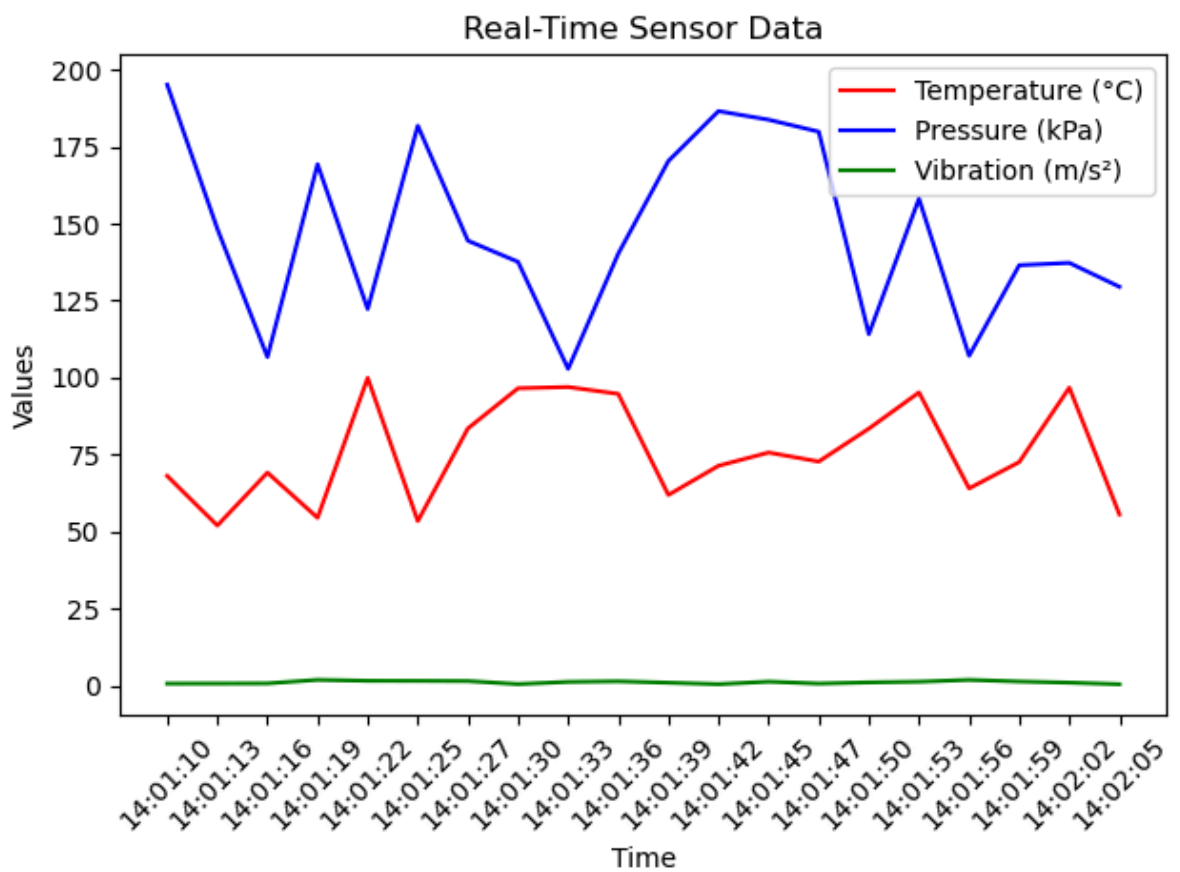
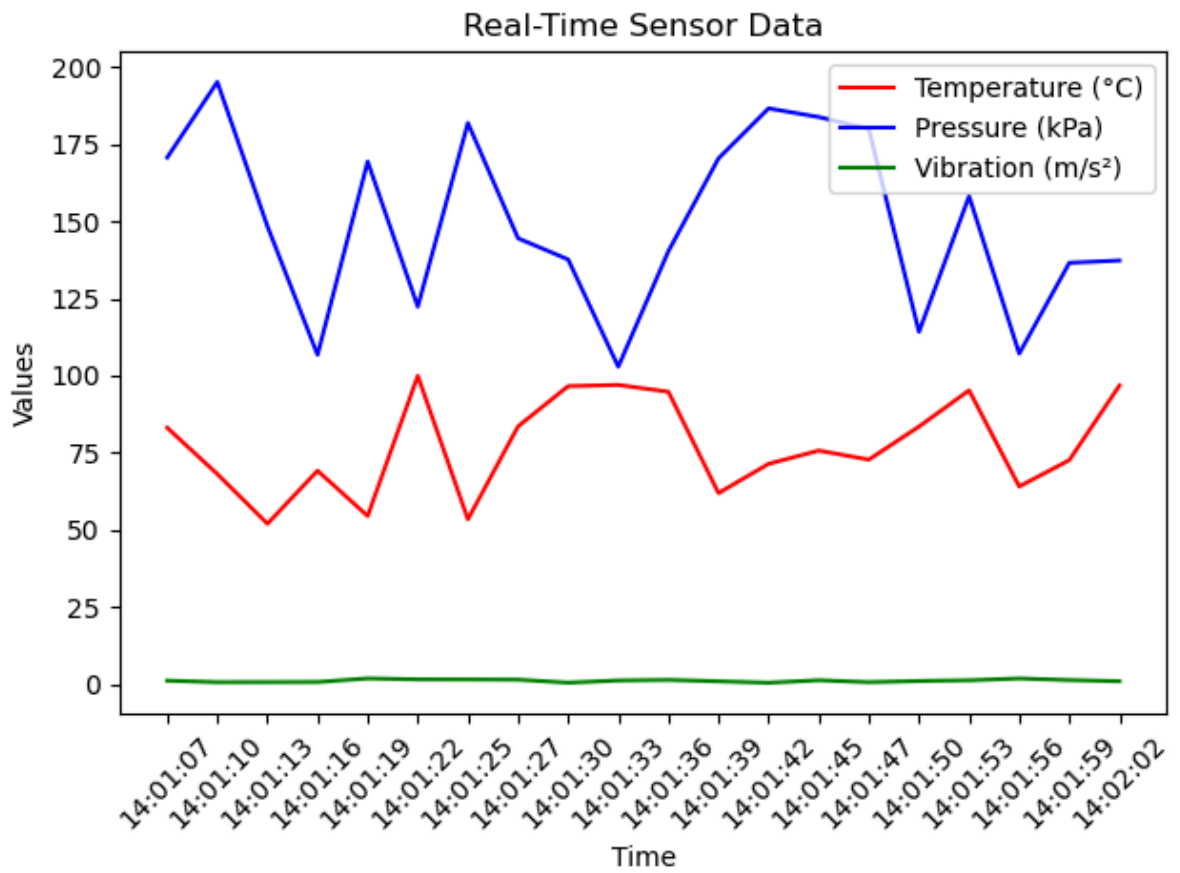
Anomalies at 14:01:53: High Temperature, High Pressure



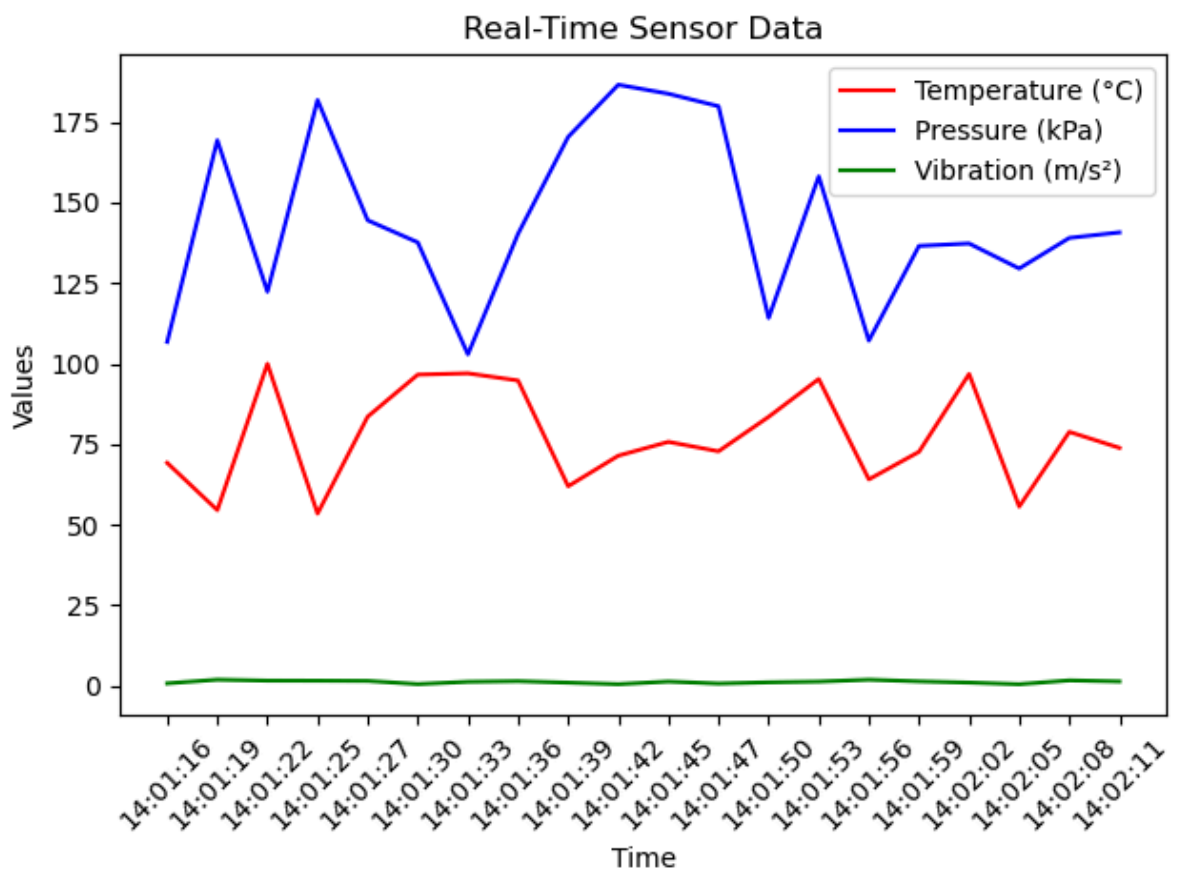
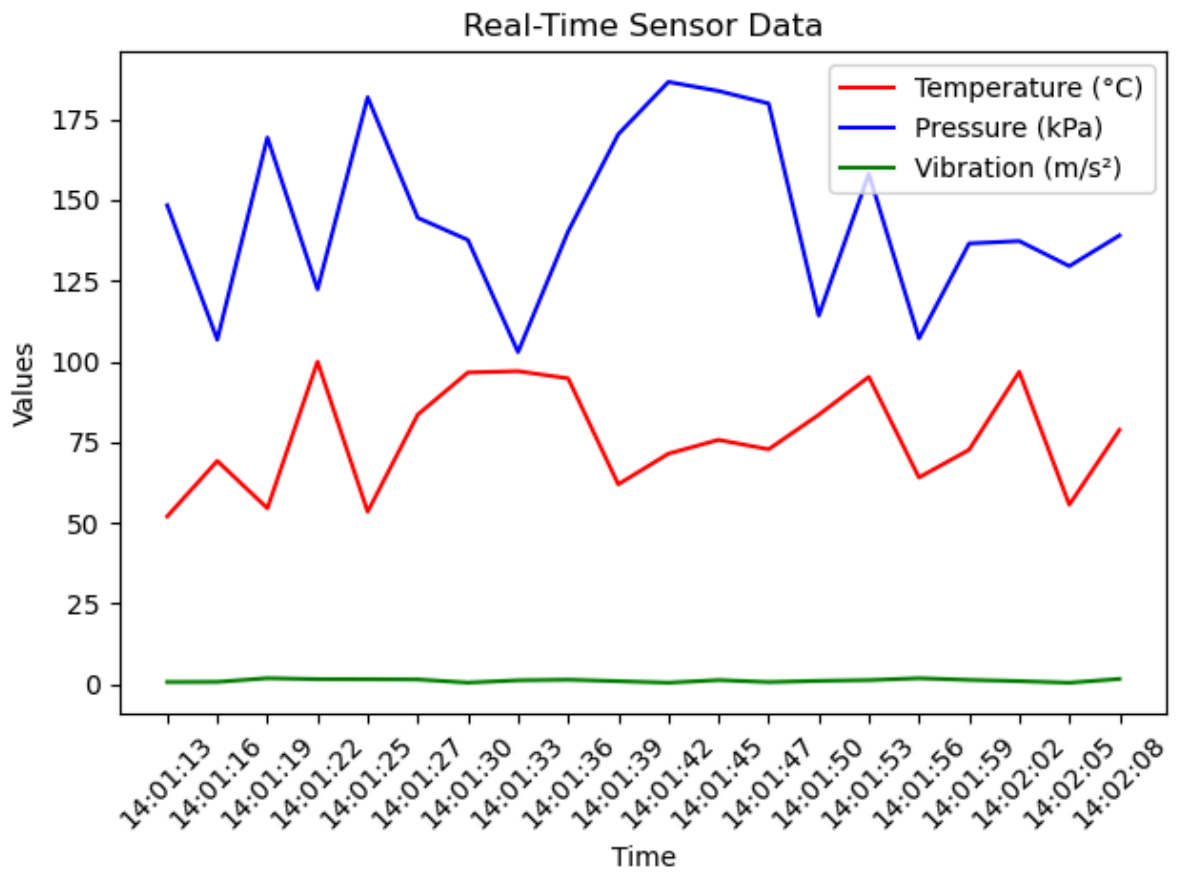
Anomalies at 14:01:56: High Vibration



Anomalies at 14:02:02: High Temperature



Anomalies at 14:02:08: High Vibration



Anomalies at 14:02:14: High Pressure